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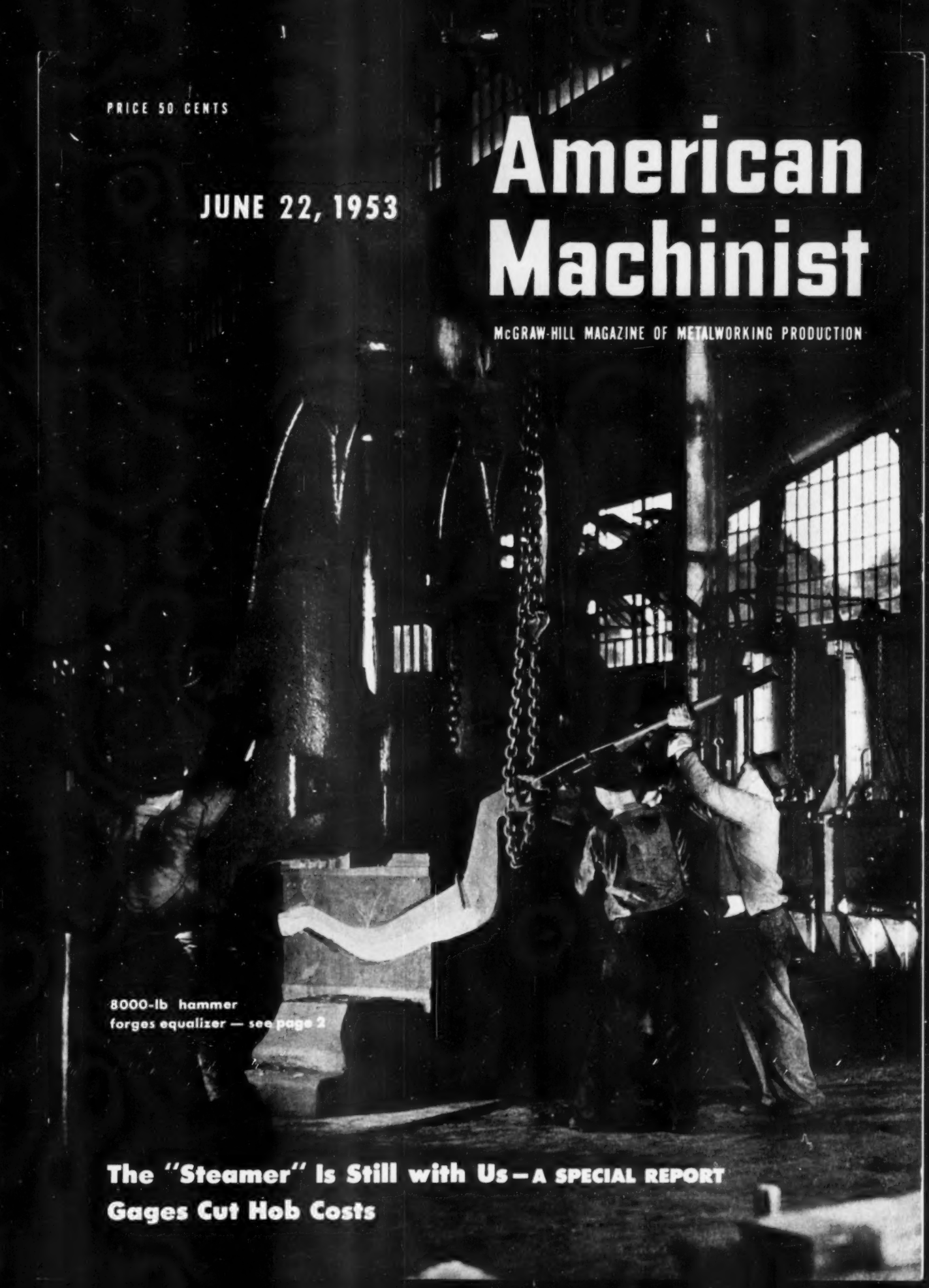
JUNE 22, 1953

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



8000-lb hammer forges equalizer — see page 2

The "Steamer" Is Still with Us — A SPECIAL REPORT

Gages Cut Hob Costs

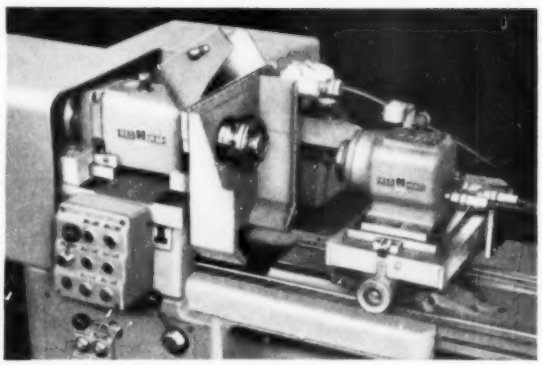
Heald "Burrizing" *finishes* 3,000 BEARINGS

. . . with only *one* part scrapped!

The use of a burr instead of a boring tool on a Heald Bore-Matic is somewhat unusual, but when it's practical, interesting things happen. Here's a case in point.

A model 121 Bore-Matic, equipped with a high-frequency grinding wheelhead, uses a ¼" shank burr for precision finishing the I.D. of miniature bearing races. Size limits of .0002", .000050" for roundness and .0001" for concentricity are easily held. Three thousand parts have been finished in five, seven-hour shifts—with but a *single scrap part!* Burr is dressed intermittently by a diamond hone and customer reports that tool life lasts up to 5,000 pieces!

Remember—when it comes to precision finishing, it pays to come to Heald.



Internal and Rotary
Surface Grinding Machines
and Bore-Matics

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WORCESTER 6, MASSACHUSETTS

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MAGAZINE OF METALWORKING PRODUCTION

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chips

STEAMERS . . . Several months ago, Executive Editor Tangerman, who served his apprenticeship in a railroad car shop, flew down to Roanoke, Va, to the shops there of the Norfolk & Western Railroad. Those shops are big, and modern, and have the further distinction of being the only steam-locomotive-manufacturing plant left in the country. Some 60 "steamers" have been built there in the last four years, and many rebuilt or modernized. In ten pages of pictures, we show typical equipment and jobs, some tricky setups, and plant arrangement. There are ideas here by the carload for anybody running a heavy machine and forge shop. Our front cover, showing a forge-shop scene in full color, is repeated and described in the Special Report herewith. The hammer is an 8000-lb unit, working on a passenger-car equalizer bar.

HOB COST SLASH . . . R L Witsche at the Louisville plant of International Harvester describes two special gages designed for measuring hob wear. With statistical quality control and these gages, the amount of stock removed in regrinding can be held to a minimum, thus lengthening hob life and cutting cost.

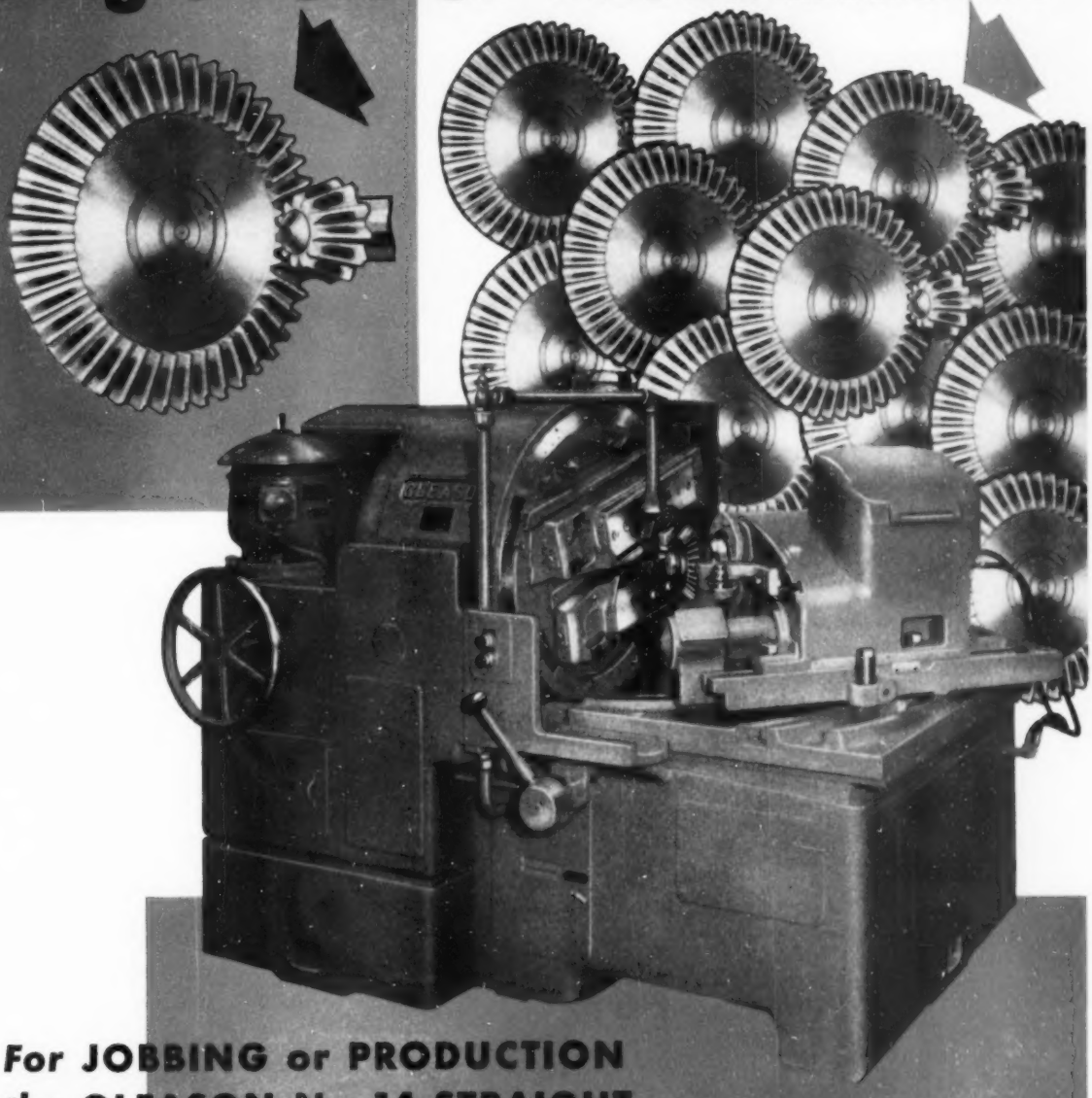
STRIPPER . . . Successful operation of drawing and compound dies often depends on design quality of the strippers, pressure pads, and knockouts. Peter Balsells (see biog) gives nine illustrated examples of construction features to be observed.

SUPPLIES . . . Harold Rhodenbaugh goes on with the thesis proposed in our May 25 issue anent standardizing standard tools. He also suggests cataloging industrial supplies, and provides an example of how he did it at Lear, Inc. There's a chance to save money by reading it.

COMING . . . July 6 *AM* will include a 16-page Special Report on Impact Extrusion of Aluminum Alloys, from Lockheed. . . . There'll also be articles on precision tumbling to finish parts, on ultrasonic cleaning, on checking costs, on machining large-diameter thin rings, on a special drill, the concluding instalment of the Monarch series on machining, and various other subjects. There'll be a 4-color cover showing a large grinder, and a spread of Shop Shots too.

DIE MAN . . . Peter Balsells' interest in tool engineering and production dates back to eleven years ago when he started to work as a tool- and die-maker apprentice. Shortly after completing the apprenticeship, he entered the University of Colorado where he was graduated in Mechanical Engineering. Ever since graduation he has been employed by a large appliance manufacturer as a tool engineer in the design and follow-up of dies, fixtures and special machines. He is an active member of the ASTE and at present is taking courses in production and industrial management at the University of Dayton.

Single Lots or Thousands...



For JOBBING or PRODUCTION the GLEASON No. 14 STRAIGHT BEVEL GENERATOR LEADS THE WAY

It is universal within its range . . . is easily set up and changed from one job to another . . . equipped with double track cam for roughing and finishing . . . handles gears up to 24" pitch diameter in large or small quantities.

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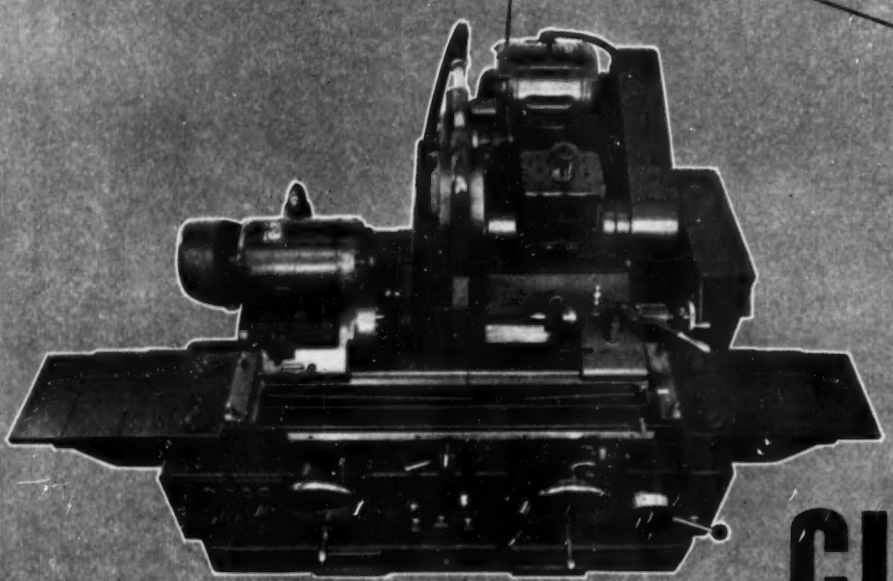
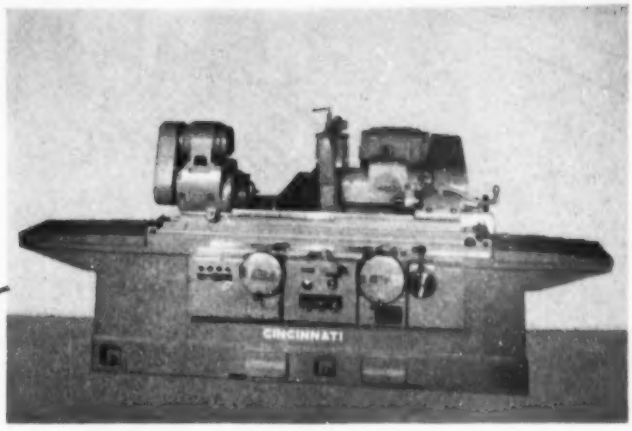
MANAGEMENT PREFERS

CINCINNATI FILMATIC PLAIN HYDRAULIC GRINDERS



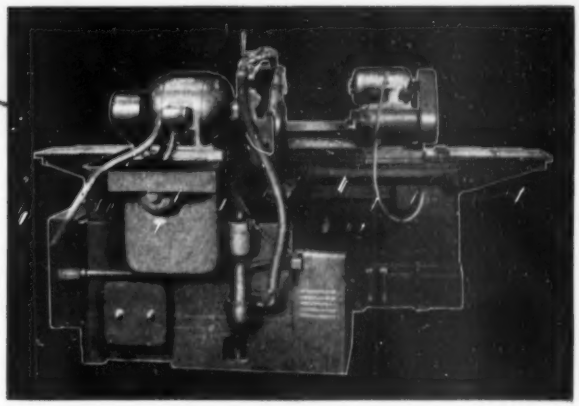
CINCIN



A look at the "balance sheet" for recent installations quickly shows why management men prefer CINCINNATI for their Plain Grinder equipment. Briefly, these machines make money for their owners. How? Well, in the first place consider their reliability. Shopmen will confirm the statement that the grinding wheel spindle bearings are a big influence in the reliability of a precision grinder. In CINCINNATIS, they're FILMATICS; they run for years without quitting. And the overall maintenance picture for these machines is very bright. A number of features such as automatic filtered lubrication of ways, unit construction, and others reduce maintenance to a negligible percentage of cost. These machines withstand severe operating conditions, too. Production control and time study men know how important is this qualification, for they can count on rapid stock removal to extra fine finishes and accurate sizing. Extra features are available for high production runs. And when it comes to actual operation, ask the man who runs one. He will tell you that CINCINNATI FILMATIC Plain Hydraulic Grinders are easiest of all to operate and their accuracy of sizing is very reliable. ¶ Any way you look at it, from the viewpoint of management or the men whose judgment management must trust, you will find that CINCINNATI FILMATIC Plain Hydraulic Grinders are the best buy for your shop. We should like to tell you more about these fine precision grinding machines.

Telephone our nearest direct office—Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Hartford, Indianapolis, New York, Philadelphia, Pittsburgh or Syracuse. Sales representatives are located in other manufacturing centers. Ask for catalog No. G-566-2 covering the 6" and 10"-L sizes; or catalog No. G-603 covering the 10" and 14"-L sizes. Brief data in Sweet's Machine Tool Catalog.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



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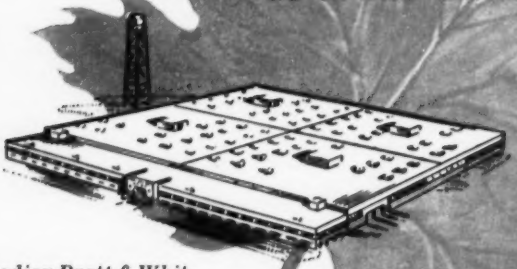
The FELLOWS METHOD
...in action!

In **Canada**
as in the United States... **PRATT & uses**



Canadian Pratt & Whitney's new 340,000 sq. ft. plant at Ville Jacques Cartier, Quebec.

At the Canadian Pratt & Whitney plant, a number of small fine-pitch external gears are cut to a high degree of accuracy on Fellows 7-Type Gear Shapers.

For its R1340 Wasp engine production tooling, Canadian Pratt & Whitney relies on the Fellows 36-Z-Type (12" Straight Hole Work Spindle) Gear Shaper for precision cutting of both the external and internal splines on the crankshaft and the cam-ring internal gear.

Fellows

WHITNEY

The Fellows Method . . .

...and precision finished on the Fellows No. 4 Fine-Pitch Gear Shaving Machine.

Aircraft production in Canada, too, finds in the Fellows Method the *production and quality control* so vital to the successful manufacture of both reciprocating and jet engines. The coordinated line of Fellows equipment for cutting, finishing and inspecting gears provides close-tolerance control in every step of gear production. Wherever you are, a Fellows representative will be glad to discuss with you the control features and economy of the Fellows Methods as applied to your gear production problems.

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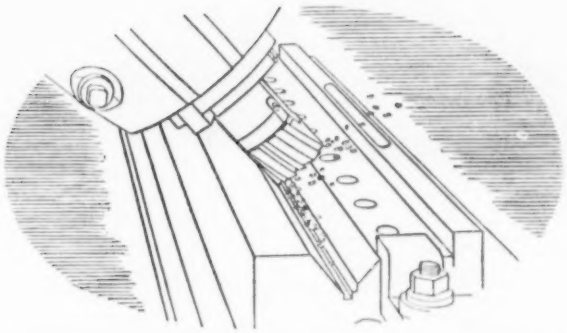
SPECIFICATIONS
No. 36 Ram Type Miller
• Cutterhead in Angular Position
• Table: 58" x 13"
• 18 Speeds: 30 to 1500
• 18 Feeds: 3/8 to 32

Ram-Type Millers

TAKE A
GOOD CUT
in Milling Production Costs!



Adjustable Cutterhead Plus Movable Ram, Saddle Cross and Knee Vertical Feeds Increase Work Range • Reduce Costs

Van Norman Ram Type Millers embody many outstanding features which provide for faster, more economical milling in the tool room, pattern shop, die and mold shop, experimental laboratory and production line.

The combined adjustments of the cutterhead and ram movement permits conventional horizontal, vertical as well as angular milling on one machine. With Van Norman Millers, most non-productive time is eliminated, production is increased, while costs are reduced.

EASY TO OPERATE . . . Front and Rear control of operation (all millers from 22L and up) power and manual feeds, six-way rapid traverse.

WIDE RANGE OF USE . . . Adjustable Cutterhead — 90° adjustment from horizontal to vertical.

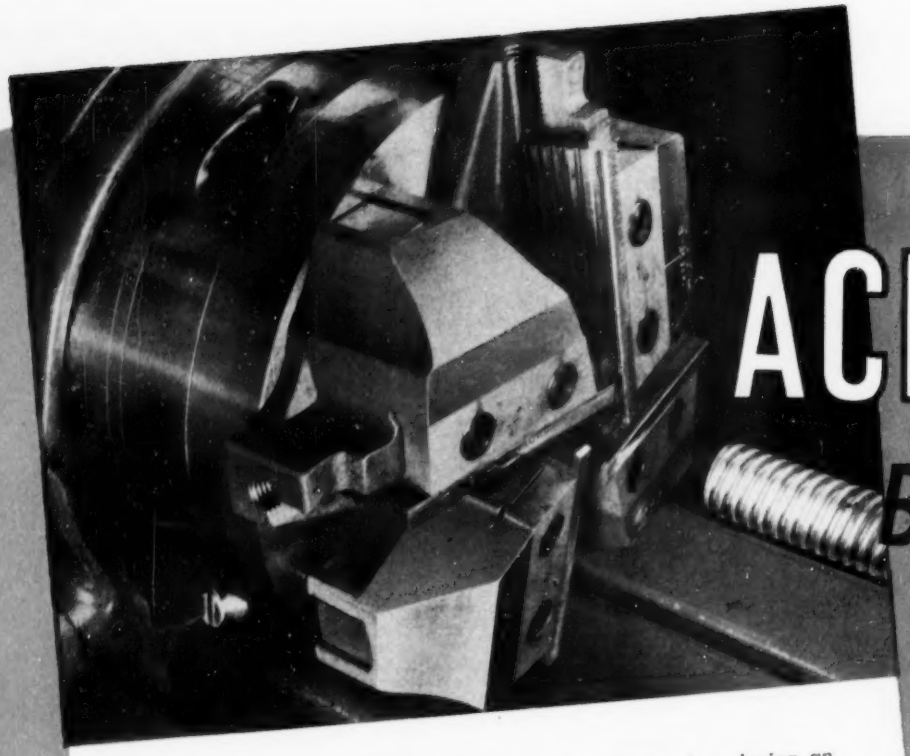
POWER AND RIGIDITY . . . Heavy-duty heat treated gear transmissions; massive cutterhead and ram; rugged column; large knee, saddle and table assemblies.

LONG LIFE . . . Automatic lubrication; antifriction bearings, multi-splined shafts. Large diameter feed screws.

Investigate Van Norman Ram Type Millers. There's a size available to meet your particular requirements. Write for information

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS, U. S. A.



ACME Better

A LANDMACO Threading Machine is today playing an important part in the production of top-quality stainless steel valves at The Cooper Alloy Foundry Co. in Hillside, New Jersey.

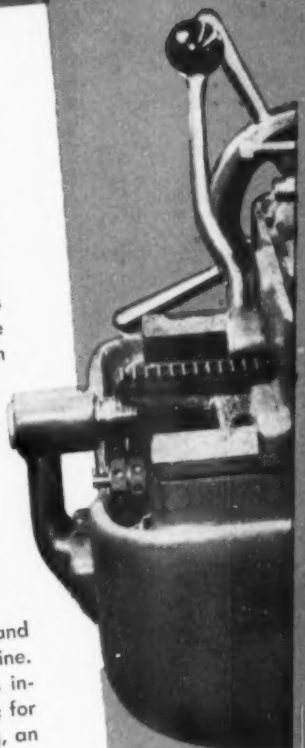
One operation, illustrated here, involves cutting ¼" pitch ½" lead Acme threads on 1⅝" diameter 304, 316, and 347 stainless steel valve stems. Both thread finish and concentricity are improved over previous threading methods, important factors in meeting the rigid quality standards for "certified" Cooper Alloy valves. IN ADDITION, large production savings are being realized. Each valve stem is threaded with a full 1⅞" thread in 2.5 minutes floor-to-floor time—as against 204 minutes by the previous method. Large savings are also being made in set-up time and in tool cost.

This operation is performed by a 2½" LANDMACO Leadscrew Machine equipped with a 2½" R LANCO Head using roughing and finishing chasers with centering throats. These chasers eliminate the out-of-round condition so common in long workpieces and produce coarse pitch threads of excellent finish in one pass.

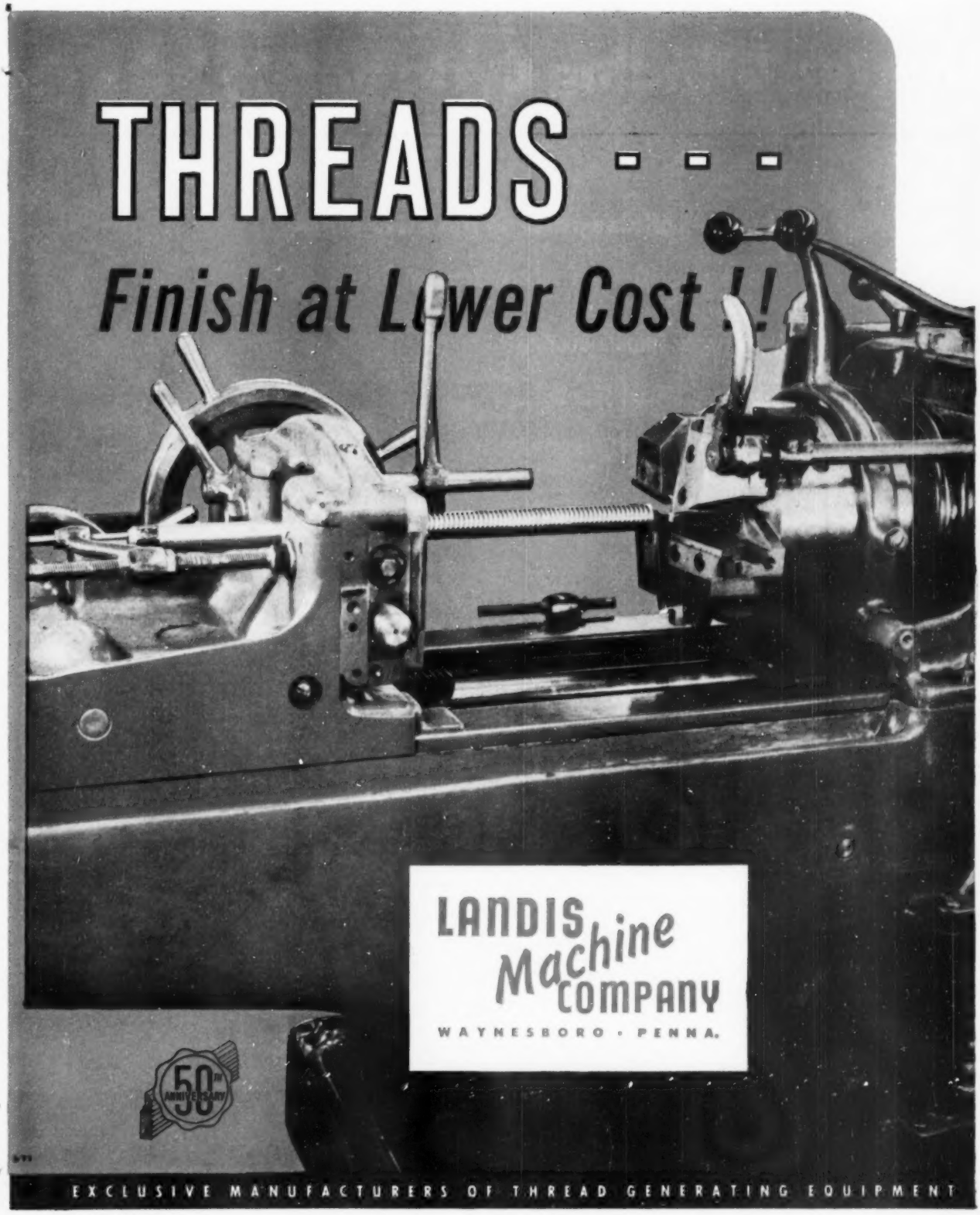
Other valve stems, requiring left-hand, right-hand, double-start, and single-start threads, are also produced on this same LANDMACO Machine. These threads range from ⅜" to 1⅝" in diameter, and thread forms include both Acme and U.N. Tool cost is low in all of these operations; for example, when producing a ¾" 6 pitch single Acme thread 5⅛" long, an average of 500 pieces was threaded between chaser grinds.

This case history in just one plant illustrates the possibilities of the LANDMACO Threading Machine in Thread Production—a better quality thread, a lower thread cost, a greater versatility of production. Are there Threading Operations in your plant where these benefits might be realized?

Write for Bulletin H-75.



WORLD'S LARGEST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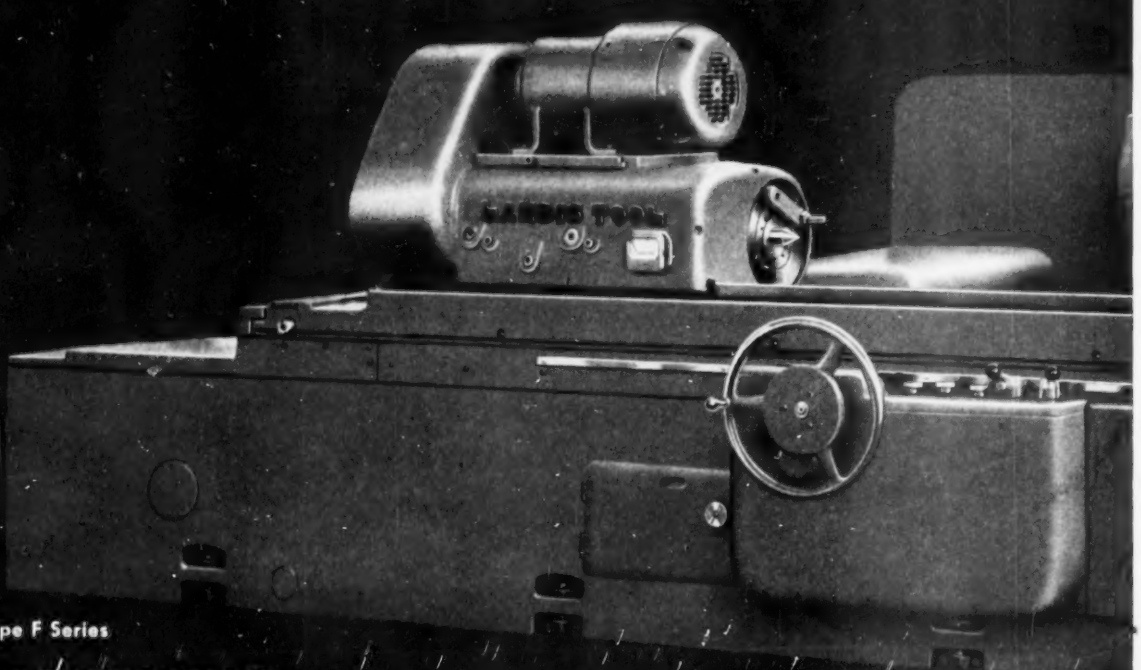
Finish at Lower Cost !!
LANDIS Machine COMPANY
WAYNESBORO · PENNA.
50th ANNIVERSARY
EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT

Heavy Cuts to Close Tolerances Shorten Grinding Cycle on Big Jobs

Exclusive Landis Features increase output without sacrifice of accuracy or finish

- Microsphere Spindle Bearing
- Reinforced Wheel Spindle



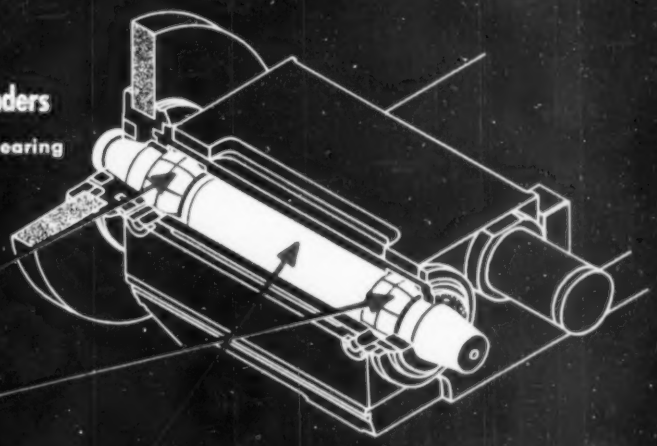
LANDIS Type F Series

Plain Grinders. Write for Catalog F-48.

LANDIS TOOL COMPANY, WAYNESBORO, PENNA., U.S.A.

Here's why you can take heavy cuts — grind fast with Landis type F series grinders

Cross section of wheelbase shows microsphere bearing and spindle assembly.



Microsphere Bearings

Close Clearance, Fast Grinding Cycle

Exceptionally close running clearance gives fast spark-out. Responds quickly and accurately to changes in wheel feed.

Reinforced Wheel Spindle

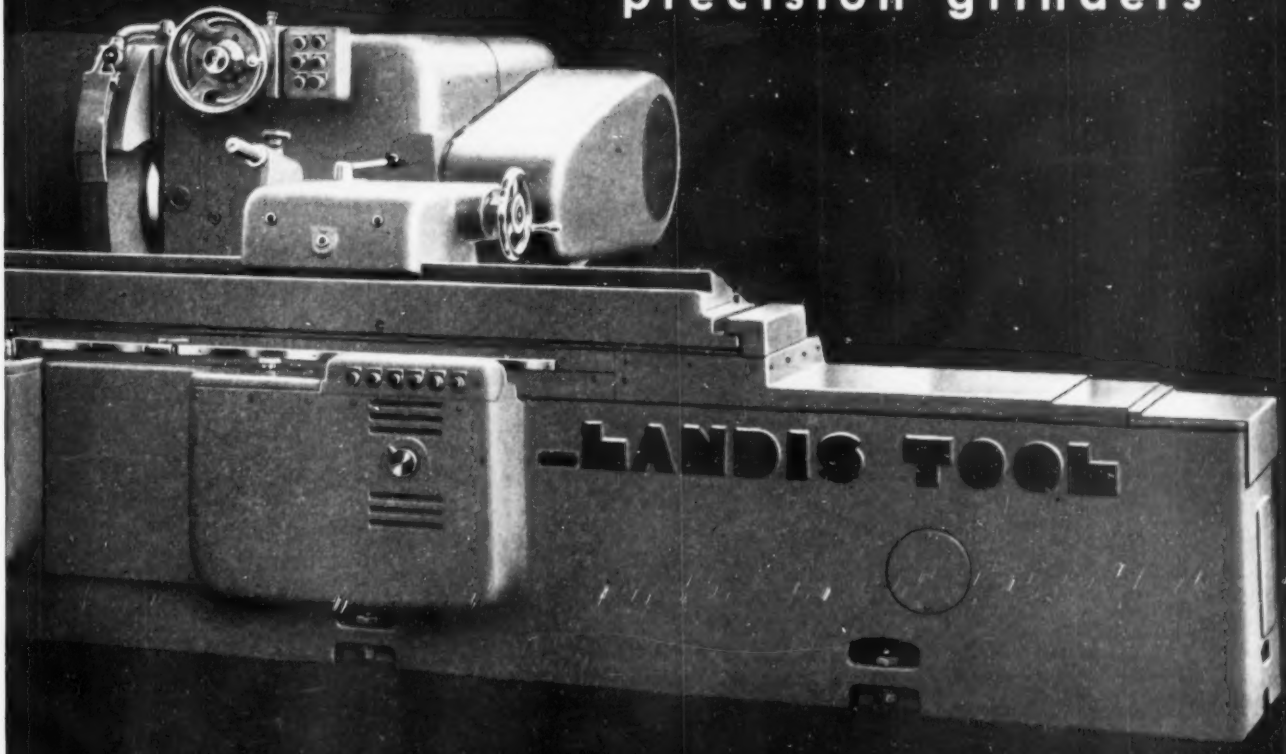
Extra Stiffness for Heavy Cuts

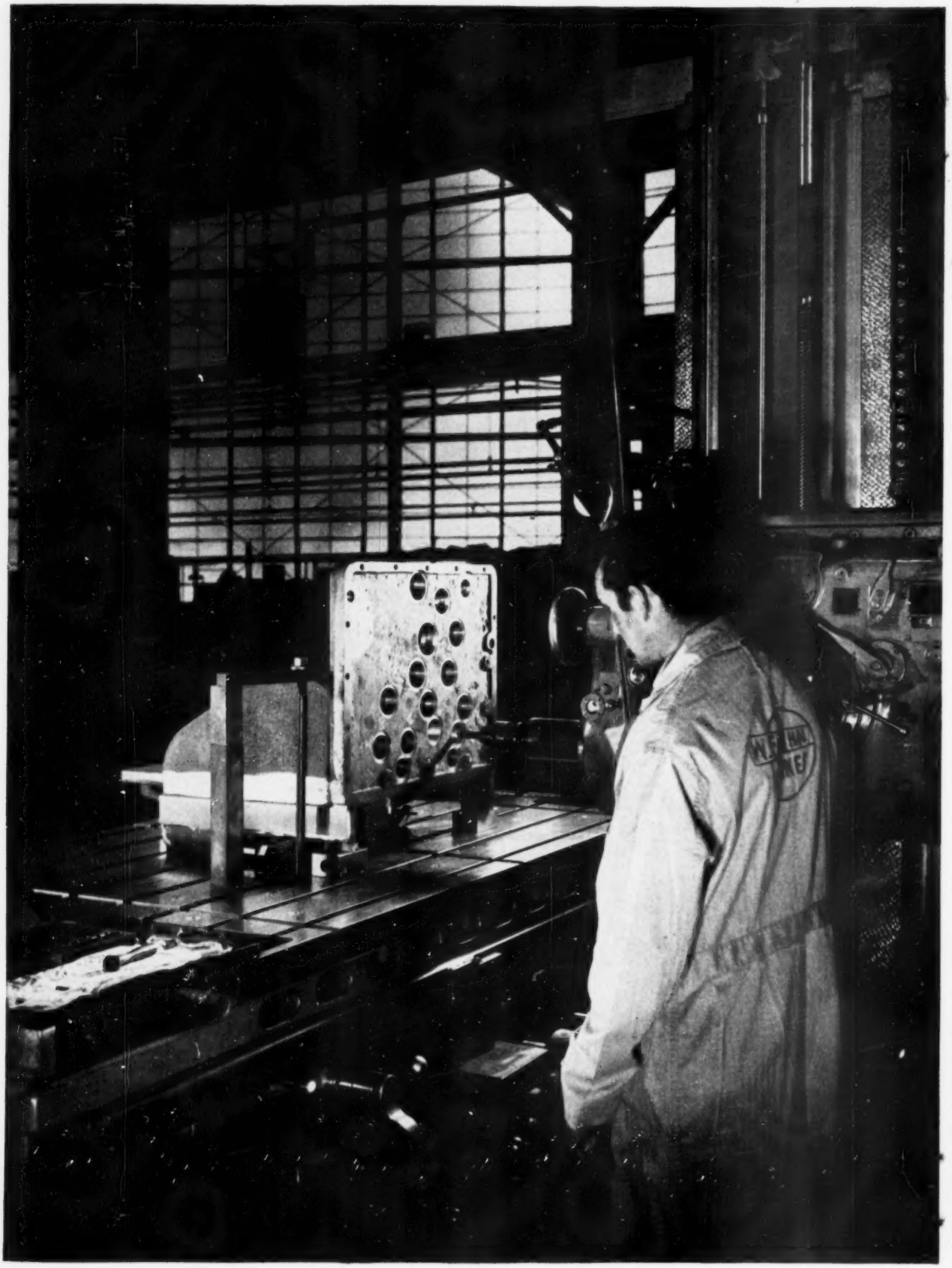
Increased diameter between bearings gives needed spindle rigidity for close tolerances and fine finishes.

159

LANDIS

precision grinders





Hairsplitting

on a mass production basis!

This workpiece is positioned automatically, bored to limits within .0002", yet handled on a production basis. It's a routine job for the versatile G&L 340-T Horizontal Boring, Drilling and Milling Machine with Automatic Electric Positioning Device.

You can increase the efficiency of boring, drilling or milling operations with this ultra-precision machine. Because of its open construction and outstanding rigidity, the G&L 340-T allows you to handle either large or small work with equal precision on both production and custom run jobs. It's extremely flexible. With it, you can perform multiple operations from a single setup . . . maintain close tolerances and parallelism even though table is fully extended.

Featuring 45 easily selected speeds and 36 feeds, this standard model table-type machine delivers 20 hp, has a 4" spindle, offers a choice of three basic table and saddle arrangements. Standard bed length is 72", headstock travel on the column is 36". Cross-feed of its 36" x 72" table is 60". Larger bed, column and table sizes are also available.

What's more, these versatile machines can be equipped with the G&L Automatic Electric Positioning Device. This unit eliminates many time-consuming hours for final hand adjustments for locating work. That's because it automatically controls table and headstock movements to precise, pre-determined settings.

For complete information, see your G&L representative or write ————

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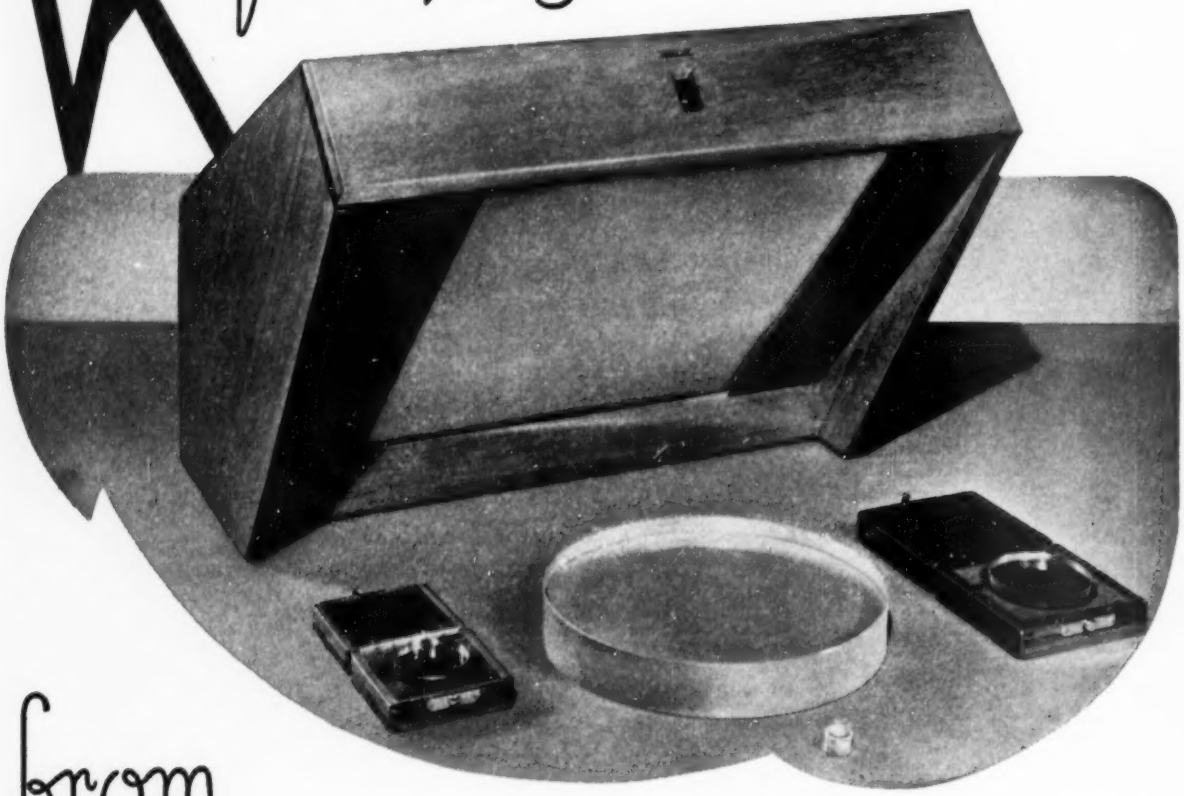
FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Open Side Planers, Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools.

Photo courtesy of
The W. F. & John Barnes Co.

VK fused quartz OPTICAL FLATS



from

½" diameter up . . . . accurate to .000001"

With VK Optical Flats, close checking of flat surfaces is simplified and more conveniently handled.

Shown here is the new Van Keuren monochromatic light, 22¼" wide, 17¼" high and 20" deep (in bench space). It is designed for use with large optical flats such as the one shown—a 10" diameter fused quartz double-surface master flat (accurate to .000001" both sides).

VK Optical Flats are available in sizes from ½" diameter to 10" diameter in .000001", .000002" or .000004" accuracy. They can be shipped within 30 days from order.

Catalog and Handbook No. 35 is available by writing: The Van Keuren Co., 173 Waltham St., Watertown, Mass. Ask for your copy.

VK

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For low-cost chip collection, get FLEXMOUNT Oscillating Conveyors

Now available from stock

Metal-working plant collects aluminum chips with FLEXMOUNT Oscillating Conveyors. Collecting conveyors feed 116-ft. main conveyor carrying chips to disposal.

LOOKING for an efficient, easy-to-install method of handling chips, turnings, blasting shot, punching or stampings? You'll find the answer in the Link-Belt FLEXMOUNT Conveyor, now available from stock. Production-line manufacture of 8, 12 and 18 in. widths assures low costs on these stock sections. It's a simple matter to build up any length desired right in your own shop. For complete information, see your Link-Belt sales office or distributor, or write for Book 2478.

How Positive Action moves materials

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FLEXMOUNT OSCILLATING CONVEYORS

13,300

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities.

Only FLEXMOUNT gives you these 8 big advantages

1. POSITIVE ACTION. Uniform, continuous chip flow is assured regardless of load. Natural spring action reduces horsepower requirements to a minimum.
2. LEAK-PROOF. Trough is a single piece of metal. No coolant drip between machine and drain point. No return run.
3. COMPACT. A "natural" for restricted space. Opening need be only slightly larger than trough.
4. LONG LIFE. Minimum of moving parts. No joints or bearings in contact with material. The resilient legs that provide spring action last indefinitely.
5. LOW MAINTENANCE. Operates at low speed. Only drive need be lubricated.
6. SAFE. No moving parts in conveying trough.
7. JAM-PROOF. Reduces production stoppages. Handles bolts, nuts, bars, broken tools and even rags.
8. VERSATILE. Various widths, standard lengths up to 100 ft., with one drive. Dividers can be installed to convey simultaneously two or more materials, such as brass and steel chips, without mixing.

Vertical lapping machine type 16FC has outstanding production capacity in such work as diesel injector parts, plug gages, size blocks, the sides of rings, and rollers. It produces flat or cylindrical work to a high degree of dimensional accuracy, parallelism and finish. Work capacity: 3" x 5" flat and 3" diameter cylindrical.

LAPPING MACHINES THAT GIVE YOU THE "TOUCH OF GOLD"

Here they are. Six great lapping machines by Norton. Each designed for single or multi-purpose — but all built to give you the "Touch of Gold."

Every second of operation, value is being added to the product through a finer, smoother, precise finish achieved in less time. This adds to your profit margin and to the ultimate user's satisfaction.

Whatever your needs there is the right Norton Lapping Machine to give you maximum output, minimum downtime; higher quality work and less dependence on manual skills.

Send for more complete information or submit samples of your work for correct lapping machine application and production. NORTON COMPANY, Worcester 6, Mass.

***To Economize, Modernize With* NEW**

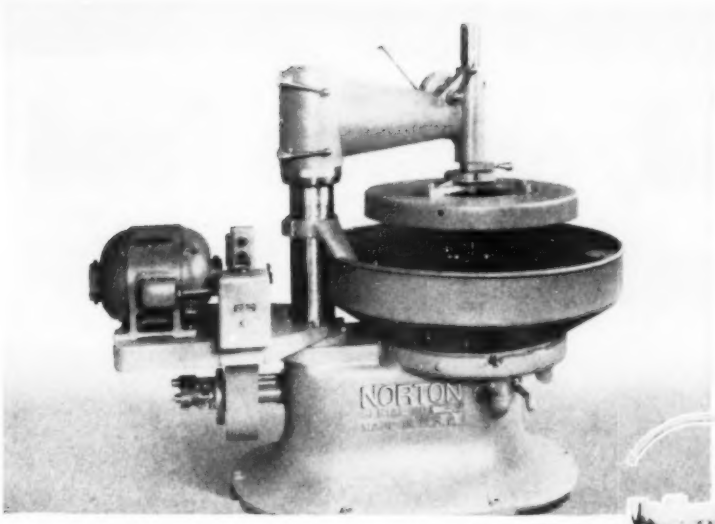
NORTON

GRINDERS *and* LAPPERS

Making better products . . . to make other products better

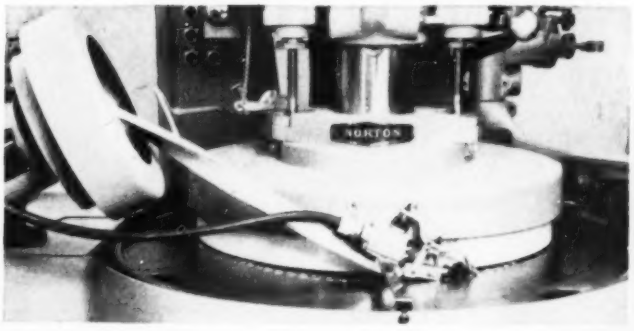
District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

Simplex surface finisher No. 12. A highly efficient machine which uses flexible coated abrasives. Ideal for handling small crankshafts for refrigerator compressors and outboard motors, eccentric and concentric cylindrical surfaces, journals and seal surfaces on many cylindrical parts. Work capacity: ½" to 2½" diameter; up to 12" length.

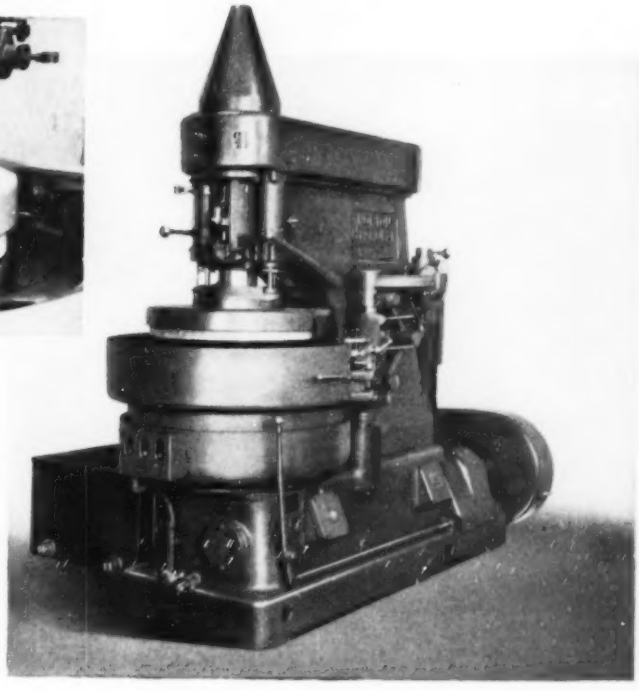


Vertical lapping machine No. 2. Arranged for flat or cylindrical surfaces requiring extremely close tolerances and degree of finish. Uses cast iron laps in conjunction with loose abrasive and a suitable lubricant or vehicle. An attachment for cylindrical lapping is furnished with the regular flat lapping machine; also a special arrangement for single face lapping is available. Work capacity: flat 4" x 9" and 4" diameter cylindrical.

60" single face flat lapping machine. Bonded abrasive laps make it a sensational performer, particularly on soft metals. It produces a clean finished surface free from imbedded grit. Provides seal surfaces, wear surfaces or flat surfaces for other machining operations. Hydraulic pressure device is available for light work; power-operated truing arm, loadless-starting inertia-delay clutch. Capacity range, three 24" pieces — one 60" piece.

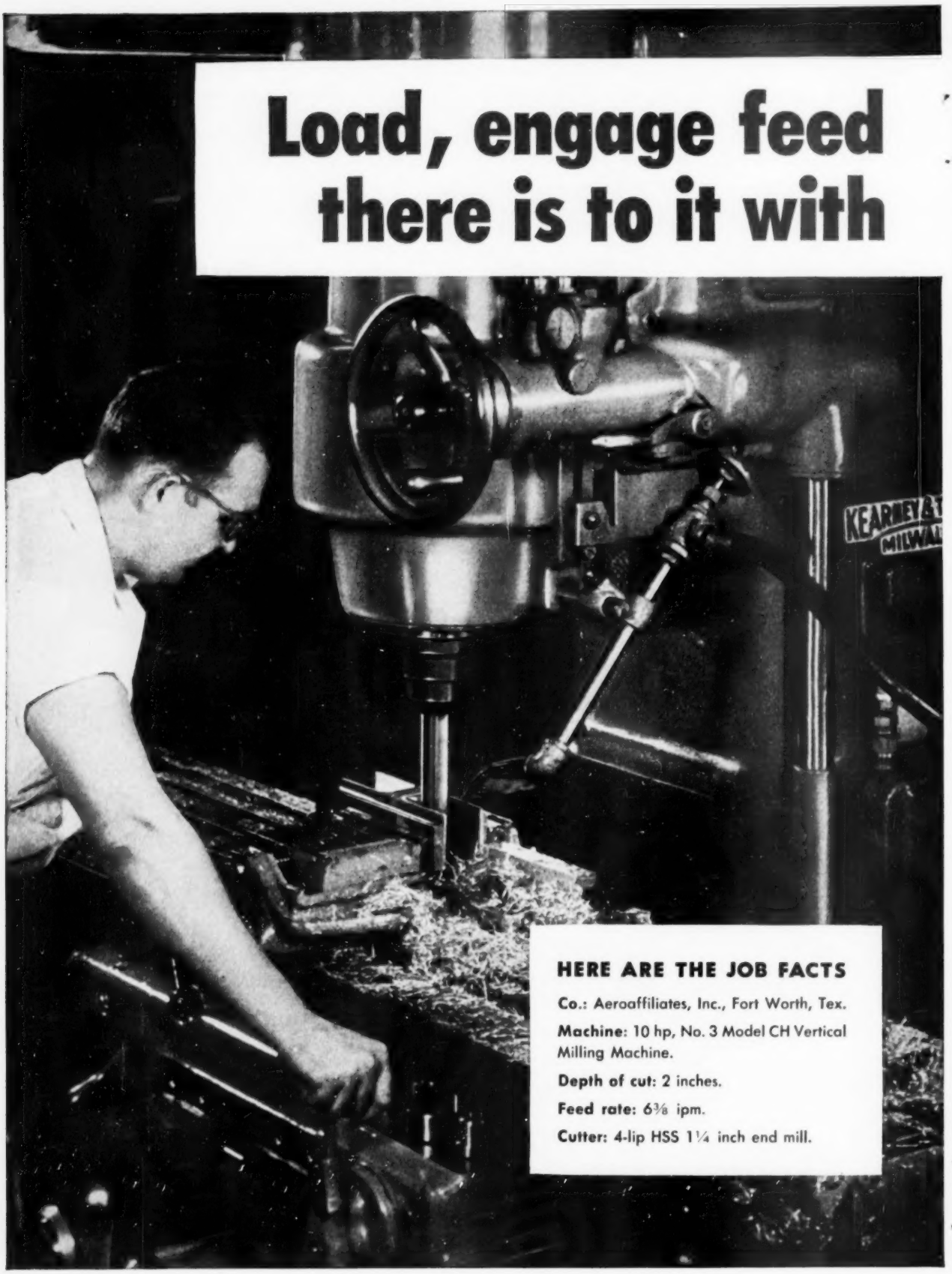


Through-feed No. 26 Hyprolap machine. 4-to-1 savings proved on finishing small, flat parts. Handles small pieces up to 8,000 an hour. Loading and unloading are entirely automatic . . . less downtime for lap dressing because work path traverses the entire work surface of each lap. High worker skills are not needed. Work up to 1¼" diameter. Modifications to handle larger work.



Hyprolap lapper No. 26. Extremely fast-cutting machine using bonded abrasive laps and filtered coolant. Finishes 20 or more work pieces simultaneously with a combination of accuracy and finish-uniformity otherwise unobtainable in mass production. Easy to operate. Lapping pressure is hydraulic powered and controlled — an exclusive Norton feature. Work capacity up to 3" thickness or diameter, to 7½" length.

Load, engage feed there is to it with



HERE ARE THE JOB FACTS

Co.: Aeroaffiliates, Inc., Fort Worth, Tex.

Machine: 10 hp, No. 3 Model CH Vertical Milling Machine.

Depth of cut: 2 inches.

Feed rate: 6⅜ ipm.

Cutter: 4-lip HSS 1¼ inch end mill.

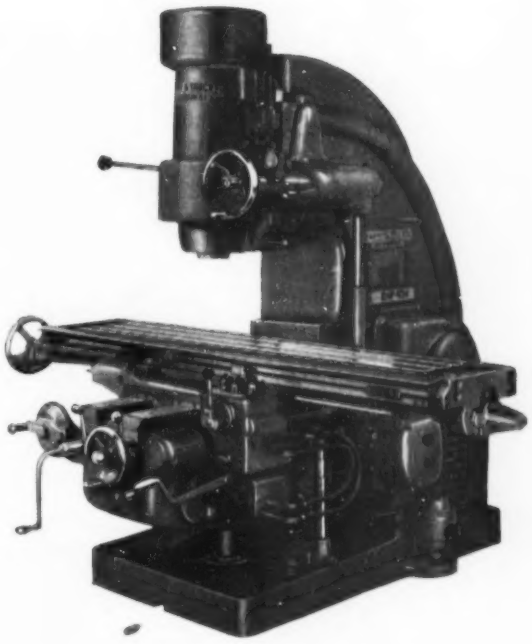
and unload—that's all this CH miller!

Aeroaffiliates of Texas select Kearney & Trecker's 10 hp No. 3 Model CH Vertical Milling Machine with *Mono-Lever and Automatic Cycle Table Control*, to speed up milling of aircraft parts and reduce operator fatigue!

TO finish-mill aluminum vertical beam fittings, this manufacturer put production on an almost automatic basis without sacrificing accuracy. He's handling the job on a 10 hp, No. 3 CH Vertical Milling Machine equipped with Mono-Lever and Automatic Cycle Table Control.

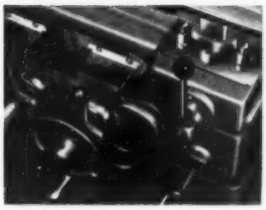
Now, after the original setup, all the operator does is load the machine, engage the feed and unload. Production is up, accuracy is maintained and operating conditions have been greatly improved to the reduction in operator fatigue.

Check this great CH line of machines for yourself. See how you, too, can cut costs, increase productivity, improve safety, get better finished products. Contact our representative or write Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wisconsin.

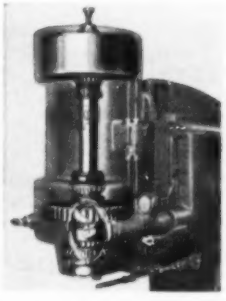


10 hp, No. 3 Model CH Vertical Milling Machine

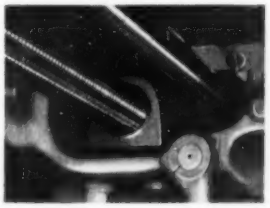
CH Milling Machine features that helped increase output — cut cost per piece



Greater Operating Convenience through Mono-Lever control facility (optional at extra cost) for table feed and rapid traverse. Also, rapid-set micrometer dials — with new vapor blasted, satin finish for greater legibility to avoid setting errors.



Greater Cutting Efficiency through spindle-mounted flywheel, (optional on CH Models) running with three bearing support. On this job it meant fast metal removal and an excellent finish.



Smoother Feed Performance through large dia. heavy-duty table feed screw that affords greater bearing contact, runs through extra-long table feed nut. All models are equipped with backlash eliminator for more effective climb milling, greater accuracy and longer screw life.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY

74.9% AVERAGE PRODUCTION INCREASE WITH WARNER & SWASEY ELECTRO-CYCLES!

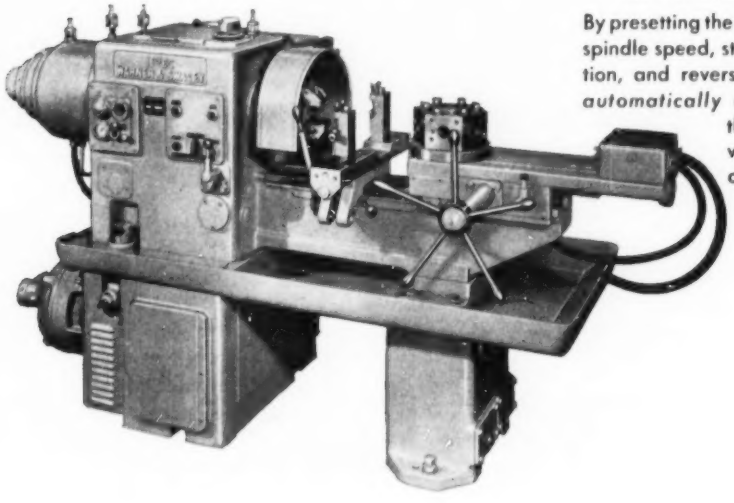
THESE PARTS are typical of the many different jobs machined in one brass shop on Warner & Swasey Electro-Cycle Turret Lathes.

Ranging from 2 to 6 operations, in lots from 100 to 10,000, each part is machined faster—*more profitably*—on the easier operating Electro-Cycles. The chart shows the exact results.

Electro-Cycles have made equally as impressive records in hundreds of other machine shops, turning non-ferrous metals and plastics. A new, improved 2-jaw air-operated indexing chuck now offers you even greater savings. Ask our Field Representative to show you how Electro-Cycles can speed production and build profits for you.

WARNER & SWASEY
16" ELECTRO-CYCLE TURRET LATHE
1½" Bar Capacity—16⅛" Chucking Swing

By presetting the Electro-Cycle "drum control", spindle speed, starts and stops, spindle direction, and reverses for each turret face are *automatically* controlled. Operator zips through precision operations, without tiring himself on time-consuming manual operations.



WARNER & SWASEY
Cleveland
"PRECISION MACHINERY SINCE 1880"

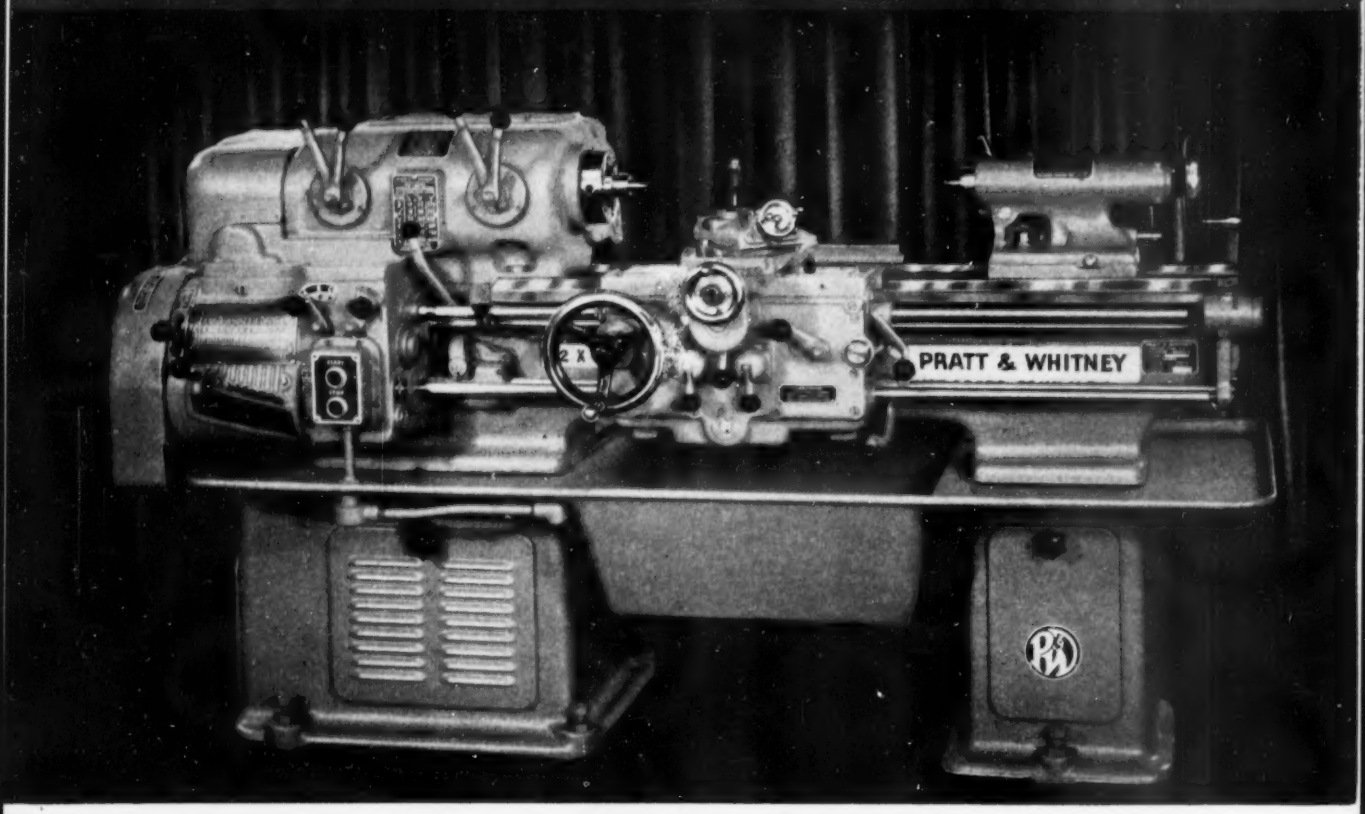
MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

When "Almost as Good" ... ISN'T GOOD ENOUGH!

You turn to

PRATT & WHITNEY

MODEL "C" *Lathes*



"The Standard by which all Fine Lathes are Judged"

Rapid scientific progress has created vitally needed new weapons for defense and valuable new products for civilian use. Matching science's progress, industry has developed these designs into tangible realities . . . and this has required working to closer tolerances than ever before. Countless tool rooms must maintain daily standards of accuracy unheard of only a few years ago.

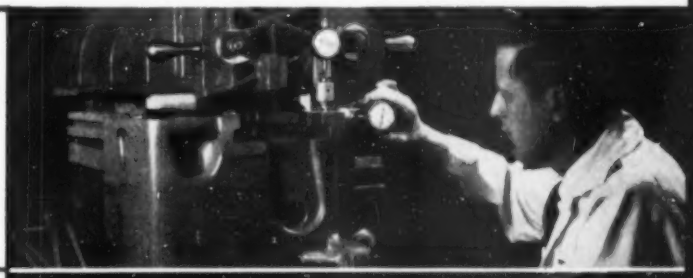
Manufacturers faced with the problem of working to these new, higher standards of accuracy, can't afford to use *"almost as good"* equipment. It's time to invest in a Pratt & Whitney Model "C" Lathe . . . your assurance of precision work produced dependably and consistently.

The Finest Example of All that Pratt & Whitney stands for

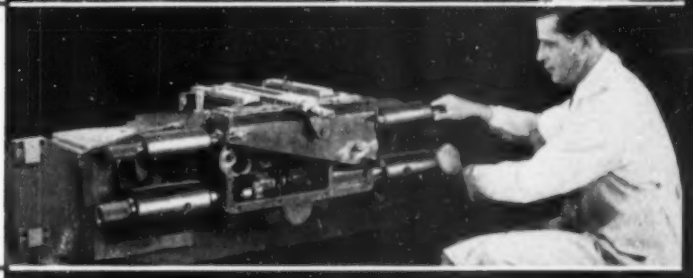
The tool room is the heart of accuracy in every plant . . . and the lathe is the heart of every tool room. For this reason, we at Pratt & Whitney have devoted to the Model "C" every detail of advanced design, quality material and skilled workmanship that make this the finest lathe available anywhere at any price.

The operations shown below — just a few of the many developed to assure *precision of assembly* — are examples of the painstaking, skillful care that assures high final accuracy.

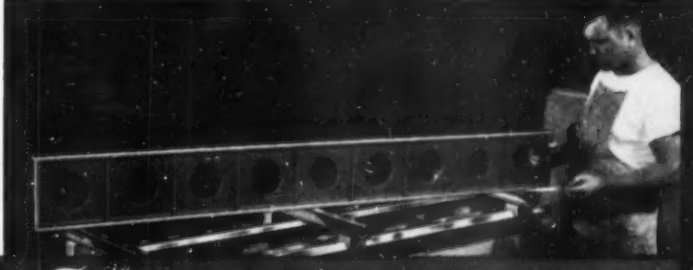
Here a Pratt & Whitney Inspector is using a specially designed fixture to check the accuracy of the ground bearing surfaces on the bed which locate the headstock and the gearbox. To assure accurate alignments, these locating points are held to extremely close limits.



Precision practice controls every step in the manufacture of P&W Model "C" Lathes. This precision fixture holds the carriage and apron castings in perfect alignment while they are pinned and fastened together.



Before the hardened and ground bed ways are accepted they must pass rigid inspections for hardness, parallelism of carriage and tailstock ways, flatness, V formation, finish and dimension. Here a carriage way is being tested. Total end-to-end error must not exceed .0002" with the straightedge in several positions.



For Complete Information

12" and 16" SIZES IN SEVERAL BED LENGTHS

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice P&W *for Accuracy*

MACHINE TOOLS • CUTTING TOOLS • GAGES

You could dot an i with this cutting tool

HERE'S THE START OF A NEW CONCEPT THAT CREATED CINCINNATI GRINDING WHEELS

The tiny grinding grit is the starting point of an entirely new approach to grinding wheels. Cincinnati Milling has proved, beyond doubt, that the grinding process is a true metal cutting process. The grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

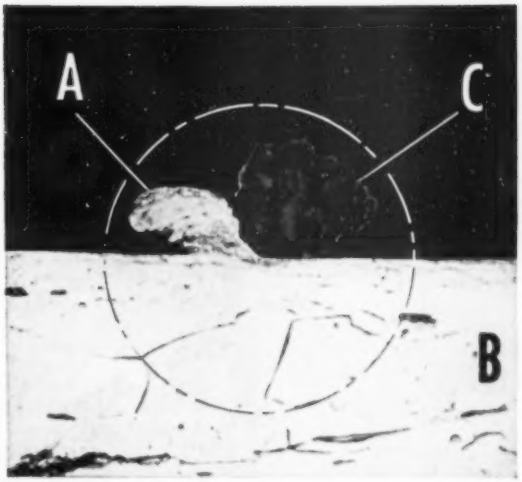
This new concept is not based on hasty conclusions. It represents 25 years of Cincinnati Milling research, coupled with practical experience in applying the basic fundamentals of grinding to a wide variety of work on both centerless and centertype machines.

Here is the starting point of development of the grinding wheel as a true cutting tool. And it is a development you might expect from Cincinnati Milling, with the world's largest background of research and experience in metal cutting operations.

For you, this means grinding wheels developed and

tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.



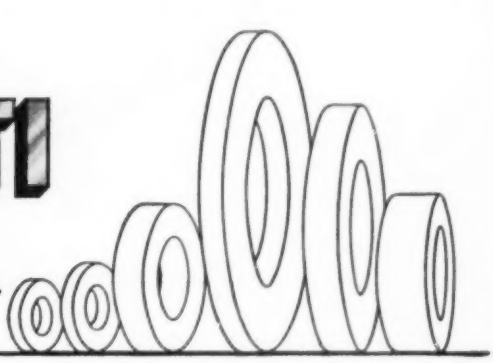
FROZEN ACTION—Tiny steel chip (A) is shown being cut from workpiece (B) by a grinding grit (C).

RESEARCH WORKER shown here is using optical instrument to check tiny deflections resulting from grinding forces.

FAMOUS NAME is stenciled on a wheel that has passed a battery of tests and is ready for shipment to one of the ever increasing number of customers.

FREE BOOKLET. Now available to industry is a new booklet entitled "A New Concept In Grinding Wheels." It contains valuable information for everyone interested in grinding operations. And a copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



Equipped Presses for Specific Operations

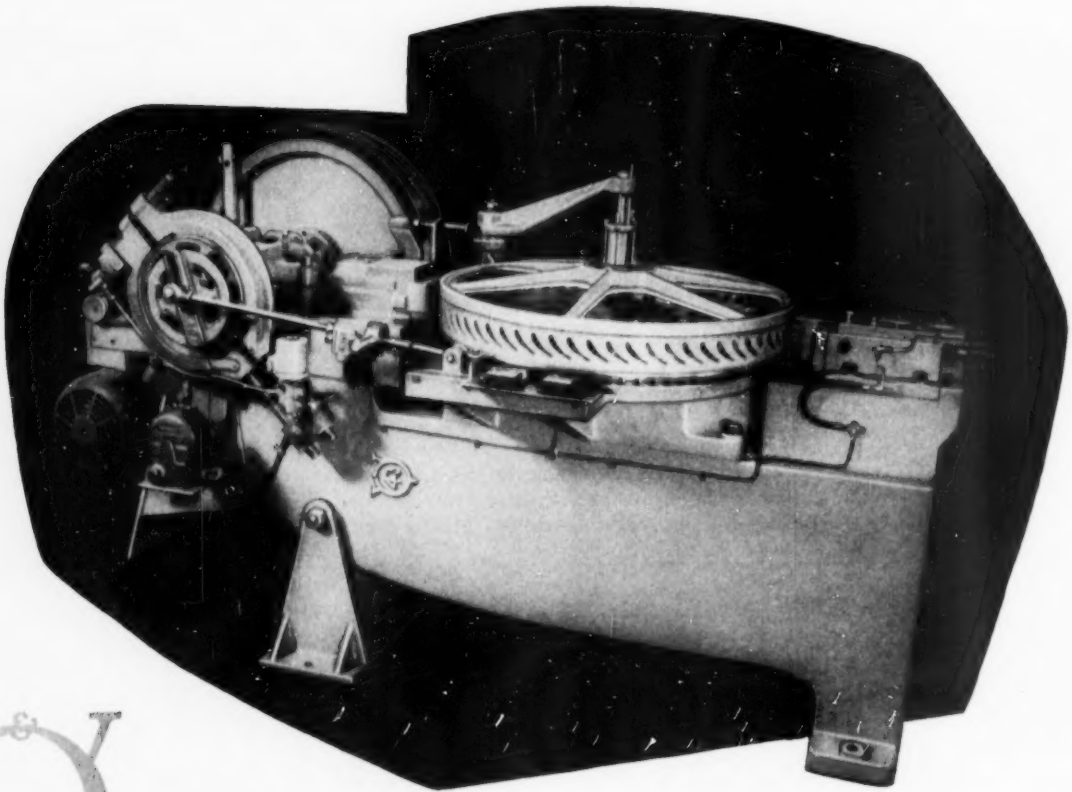
IT TAKES THREE MEN TO RUN ANY PRODUCTION MACHINE

A production machine has to have a set up man to get it running, an operator to run it, and a maintenance man to keep it running. And the design has to be right for all three men if quantity and quality of output are to be right.

For example, here is a V & O Equipped Press which has two slides to punch holes from the outside in, or from the inside out, of large diameter rings, for a controlled burr. The operations are all automatic except loading and unloading.

This press is laid on its back. With most of the moving parts in a horizontal plane the set up man finds it easy to index the mechanisms and adjust the dies, the operator has less trouble and fatigue in loading and unloading, and the maintenance man has everything visible and accessible.

Our representative would like to tell you about the special features by which other V & O Equipped Presses are solving specific production problems. He is right near you. Why not ask us to send him in?



THE V & O PRESS COMPANY *DIVISION OF EMHART MFG. CO.* **HUDSON, NEW YORK**

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

One hour

1800 lbs.-rough

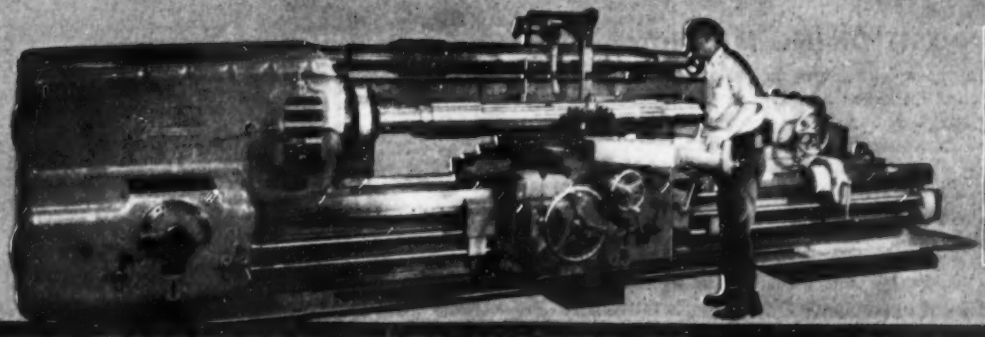
1300 lbs.-finished

One hour to finish turn this Diesel Locomotive Driving Axle from the rough forging, removing 500 pounds of chips and using 60 horse power cuts in the process.

This shows what a 25" "AMERICAN" Hydraulic Duplicating Lathe driven by a 50 H.P. motor can do. Production records of this kind are the rule rather than the exception and are being made daily.

"AMERICAN" Hydraulic Duplicating Lathes reduce machining time 50 to 75 per cent . . . cut costs to the bone . . . pay good dividends on the investment.

Repeat customers vouch for this in the most convincing way.



Bulletin No. 35 gives a complete description and shows many examples. It's yours for the asking.

THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

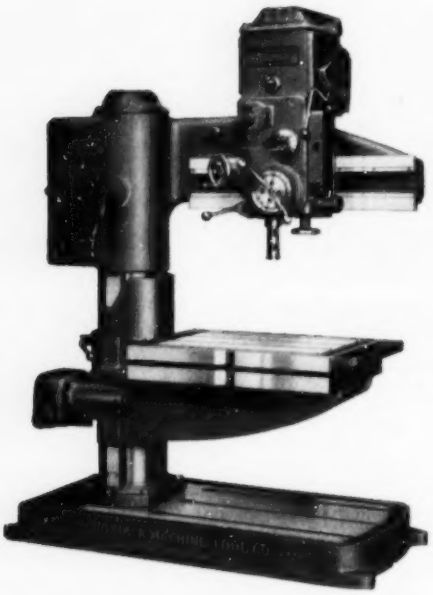
Lathes and Radial Drills

FOSDICK

precision

positioned holes

production



SENSITIVE RADIAL DRILL

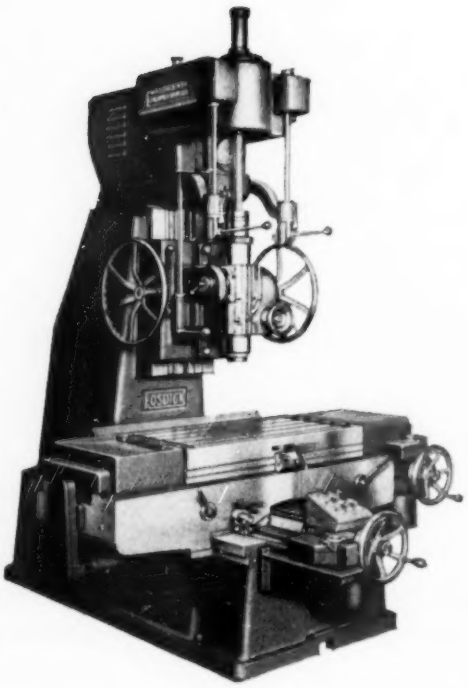
Exclusive with Fosdick, the Sensitive Radial combines upright and sensitive features– rigidity, compactness and convenient table height—with the capacity and flexibility of a radial. Table is universally adjustable, arm rotates at constant height and controls are always within convenient reach. One piece column, 3 and 4 ft. arms. Drills up to 1¾ ".

JIG BORER and AUTOMATIC POSITIONING MACHINE

Jig boring with automatic positioning has eliminated the need for highly-skilled labor for precision hole positioning! With duplicating bars—made quickly, stored easily—the ordinary operator can position table and slide at the same time to within plus or minus .0001 " *at the touch of a button!* And Fosdick's Jig Borer costs less than any comparable machine on the market.

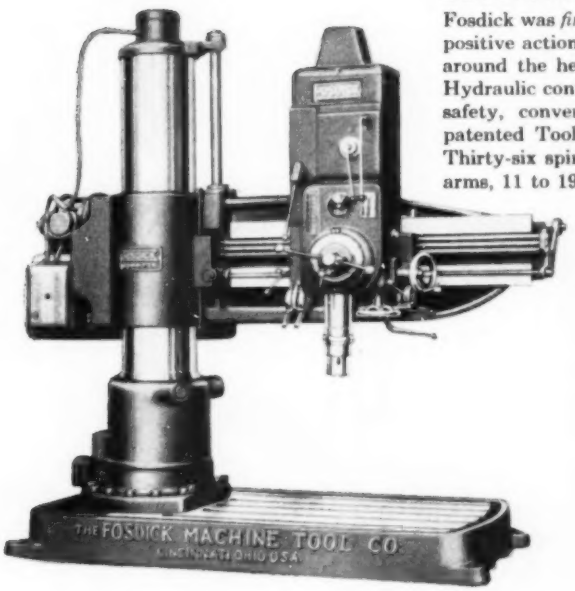
Duplicating drilled, bored and tapped parts—*weeks, months* or *years* apart—is fast, economical with Fosdick's Automatic Positioning machine. Set up time measured in minutes! Costly jigs are replaced by compact duplicating bars made of standard ⅝" stock, bored for each hole.

Table sizes: 18"x36" (no automatic positioning) and 22"x44". Table to spindle capacity, 27". 3 hp motor standard, 5 or 7½ hp optional.



ECONOMAX HYDRAULIC RADIAL DRILL

Fosdick was *first* to use hydraulics in a radial for smooth, positive action, easy operation. Controls are grouped around the head for maximum operator efficiency. Hydraulic controls and clamps are interlocked for safety, convenience. Standard equipment includes patented Tool Ejector and built-in fluorescent tube. Thirty-six spindle speeds, eighteen feeds. 3 to 8 ft. arms, 11 to 19 inch columns.



UPRIGHT DRILL

Two sizes, 25″ and 30″ with either round or box columns. Twelve spindle speeds from 60 to 1500 rpm, nine power feeds from .005″ to .043″ per revolution.

SENSITIVE DRILLS

For economical production of small drilled parts. 1 to 6 spindles in either six or nine speeds from as low as 55 rpm to as high as 3600 rpm, four power feeds.

Mail this coupon today!

FOSDICK

The Fosdick Machine Tool Co., Dept. A, Cincinnati 23

Please send descriptive bulletins for the following machines:

- ☐ *Sensitive Radial*
- ☐ *Economax Radial*
- ☐ *Jig Borer*
- ☐ *Automatic Positioning Machine*
- ☐ *Sensitive Drill*
- ☐ *Upright Drill*

Company

Address

Individual

Title

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

Tungsten Carbide Tools

Precision Machine Ground-From-The-Solid

Quality Engineered } BURS, REAMERS, END MILLS BORING BITS & OTHERS

THE

ATRAX

COMPANY

NEWINGTON 11, CONNECTICUT

Representatives and Distributors in principal cities in the United States and Canada. Write us for the name and address of our Representative in your area.

Send for complete catalog NOW!

Production Pointers from GISHOLT

TIME-SAVING IDEAS

Presented as a service to machine shops, we hope some of these interesting ideas, culled from thousands of jobs, will suggest ways to help you cut time and costs in your own metal work.

NOW, FOUR TIMES THE SURFACE LIFE FOR THESE MILL ROLLS

Yet SUPERFINISH Achieves It In Half the Time

Where you have parts requiring the finest possible surface smoothness, Superfinish saves time and gives you better, longer wearing surfaces. You can bank on it!

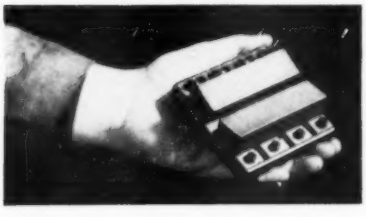
Here, Superfinish is at work in the steel industry—finishing mill rolls used for producing stainless steel strip. The machine, a Model 78 Mill Roll Superfinisher handles a variety of these rolls in a fully automatic cycle.

Here's how it saves:

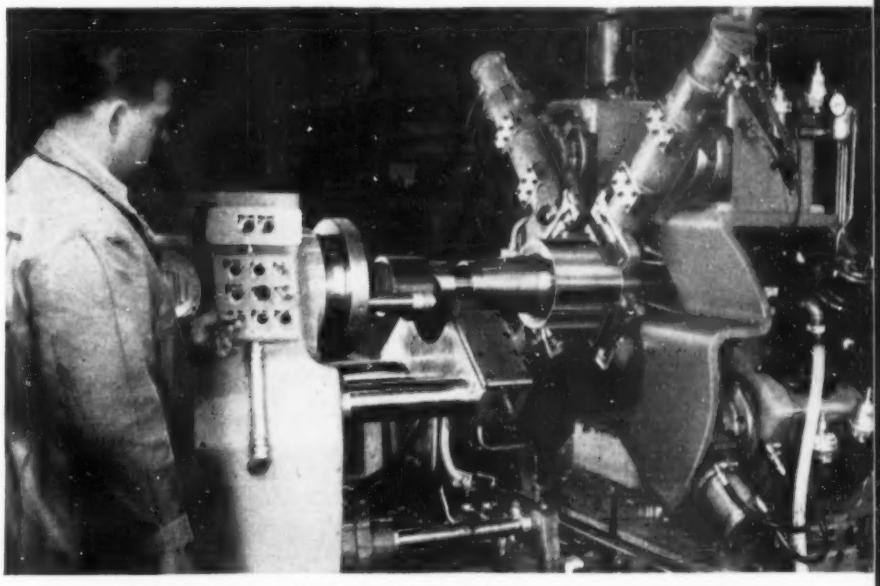
Finishing—Rolls are brought down from 15-20 to 1-2 micro inches RMS by Superfinishing. A roll 36 inches long by 20 inches in diameter requires just 15 minutes to finish . . . less than half the time for grinding.

Longer Life—The Superfinished surface is base metal, not the soft, annealed "smear metal" produced by grinding heat. Experience has proved that this harder, better wearing surface gives the rolls *more* than four times the service life of those finished by the old method.

Reduced Buffing—The Superfinished rolls leave a much finer surface and the stainless strip requires far less buffing to obtain the desired reflective surface.



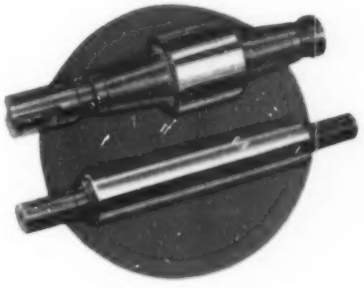
Quick-change stoneholder, with two Superfinishing stones, as used on each of four heads.



Superfinisher has fully automatic cycle. After loading, operator merely presses a button; the spindle then drives the roll, and the finishing heads move up to the work and begin oscillating.

These basic advantages of Superfinish—better, longer lasting surfaces that cost less—can be applied to your problems involving cylindrical surfaces. Ask for the reprint, "Mill Roll Superfinisher," which tells the complete story. We will also be glad to send you a free copy of the most authoritative textbook on this modern process, entitled, "Wear and Surface Finish."

Superfinishing gives these mill rolls smoother, longer lasting surfaces, and produces them in less than half the time required by grinding.

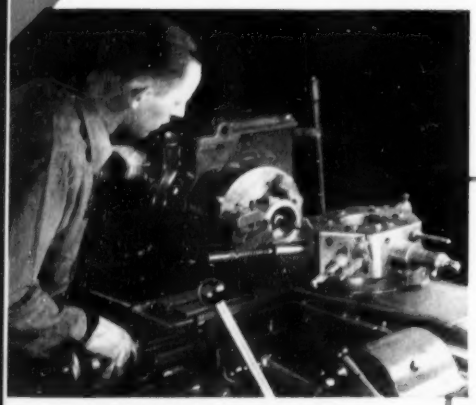


Roll surfaces finished to a smoothness of 1-2 micro inches RMS.

IDEAS LIKE THIS CAN INCREASE YOUR PRODUCTION

TIME-SAVING IDEAS

Many Surfaces Handled by Ram Type Lathe in One Chucking



First drilling operation on steam trap while facing from square turret.

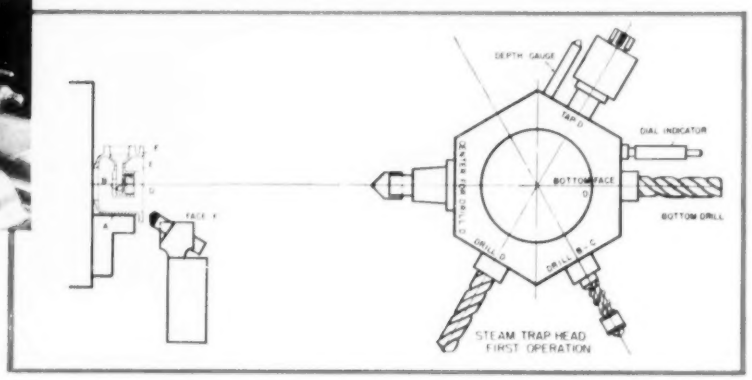
Careful planning shows up on these first operations for a steam trap head. A Gisholt No. 3 Ram Type Turret Lathe was selected for it because of the many surfaces that can be handled in one chucking.

For fast handling, an air-operated chuck is used. These are the operations: drill D, face F, drill B and C, bottom drill D to stop, and tap D while finish facing F. Time is less than 2.5 minutes, floor-to-floor.

To insure concentricity for B and C, the drill is supported with a bushing in D. Note the indicator to hold the depth of the bottom drill for D. This keeps the depth in perfect relation to face F. Interesting, also, is the depth gauge for D, which assures accurate tapping to the bottom of the hole.

When you plan your setup carefully like this around a fast machine like the No. 3 Ram Type Lathe, you're bound to get low-cost, high production every time.

Here, use of air chuck and combination tooling increases speed, while the indicator and depth gauge insure maximum accuracy.



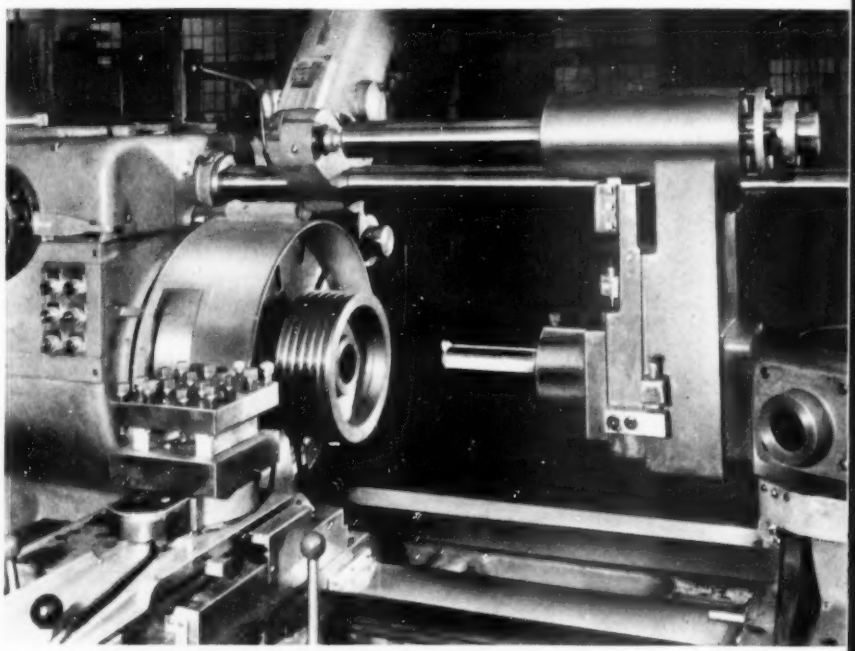
HERE'S HELP FOR SOME OF YOUR TRICKY BORING JOBS . . .

Special Unit on Saddle Type Lathe Handles Reverse Tapers or Special Contours

Here's an idea that can make boring operations easier. It's a special taper boring unit, mounted on a 3L Saddle Type Turret Lathe. In this case, conventional taper boring, it makes use of a stub boring bar, a slide tool and a special overhead pilot bar with milled slot holding a cam plate.

It works this way: As the turret carriage feeds forward, a cam follower on the slide tool rides along the cam plate. This guides the tool slide and boring bar along the angle of the cam plate . . . continuing *past* the cut before stopping. As the turret is retracted, the boring tool is held away from the finished surface to provide tool relief on the return stroke. When the tool is clear, it is automatically recocked for the next piece.

With this special attachment, fast, accurate bores, tapers and contours can be made without tool marks.



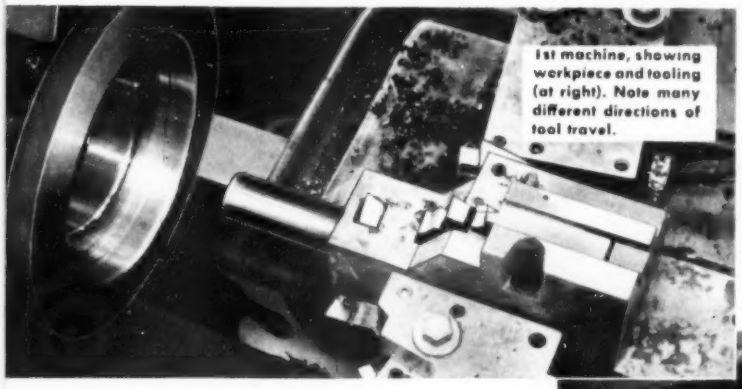
Special taper boring unit on fixed center 3L Saddle Type Turret Lathe

GISHOLT

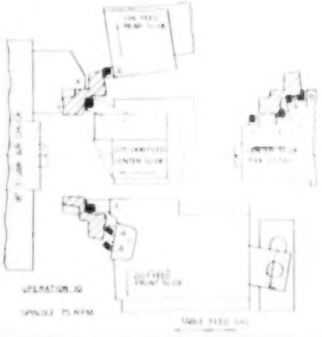
TIME-SAVING IDEAS

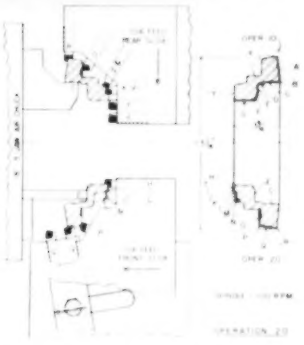
FAST TEAMWORK TO BEAT HIGH COSTS

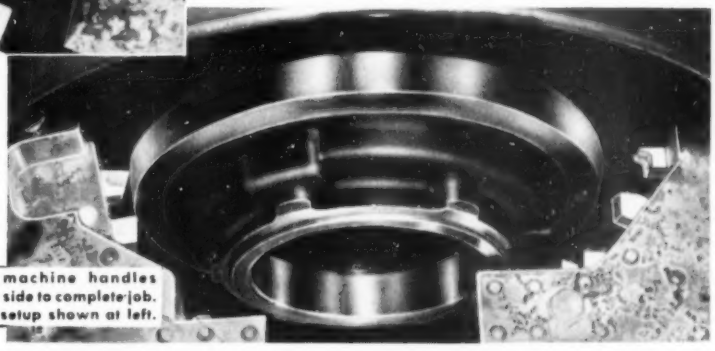
Two Simplimatics and One Man Finish Parts in Jig Time



1st machine, showing workpiece and tooling (at right). Note many different directions of tool travel.







2nd machine handles other side to complete job. Tool setup shown at left.

It's simple ideas like this that frequently pay the biggest dividends.

By pairing up two Simplimatic Automatic Lathes with one operator, these bevel drive gears are produced in quick "one-two" sequence.

The first operation takes 5.0 minutes floor-to-floor. Rough and finish cuts on both straight and angular surfaces are done by front and rear slides while five tools on the center slide handle three diameters and two radii at the same time.

Time is 2.5 minutes floor-to-floor for the second operation. The rear slide faces the end, gear flange, chamfers, and rough turns two shoulder diameters. The front slide, operating longitudinally, finish sizes the two shoulders, corner rounds the bore and carries a sliding tool with cam block for rough and finishing the taper O.D.

Easily tooled to combine both straight and angular work of all kinds—the Simplimatic provides fully automatic operation, enabling one man to tend both machines. It's another example of the adaptability of the standard Simplimatics. New catalog shows many examples. Ask for it.

"TURN-ABOUT" GETS RESULTS WITH AWKWARD PARTS

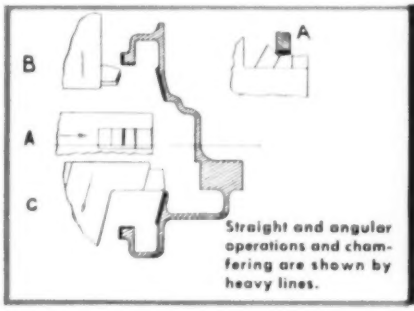
Chuck Holds Tools—The Slide Holds the Work—in this Novel No. 12 Hydraulic Lathe Job

See how good headwork and the No. 12 Hydraulic Automatic Lathe are paying off on this gear case job:

To do the awkward, jumbo-size part the usual way on a conventional turret lathe would have dictated an excessively large machine operating at slow speeds.

However, by turning the job around...and ingeniously mounting the tools on a rotating head and the gear case on a special longitudinal slide, the *work* feeds to the tools. Boring tools, mounted in a stub boring bar, do rough and finish boring and chamfering (A). Forward motion of the work-holding slide then stops and tool (B) faces outside surface. At the same time, tool (C) does angular surface—completing job in a single, automatic operation. Floor-to-floor time is just 1.7 minutes.

No. 12 Hydraulic Lathe with rotating tools (instead of work) shows way to real savings in machining time and costs ...and in machine investment and floor space.



Straight and angular operations and chamfering are shown by heavy lines.

Operator holds finished gear case. Note special holding fixture on longitudinal slide.

GISHOLT

GISHOLT

TIME-SAVING IDEAS

HOW TO TURN A HARD JOB INTO AN EASY ONE

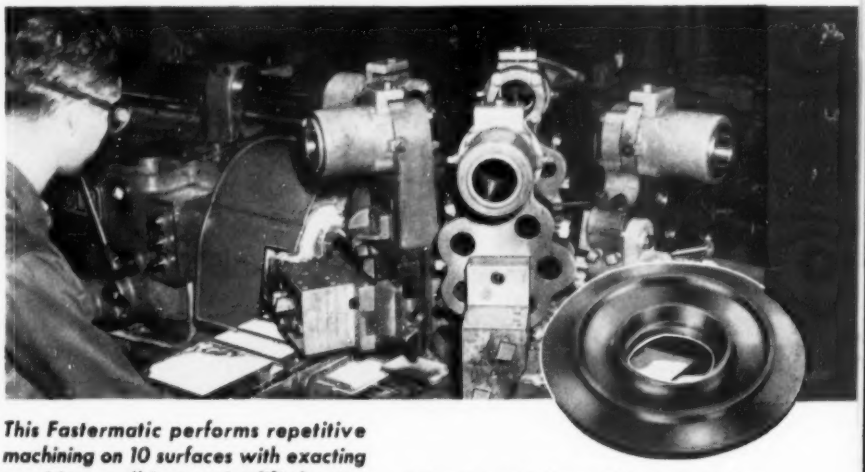
Ten Critical Surfaces Machined by Fastermatic... Automatically

Here's the problem that faced this producer of 7" ball-bearing support rings for our jet program:

The material is difficult—alloy steel forgings of 40-41 Rockwell C. A large number of cuts are required—10 in all. And, close tolerances must be held.

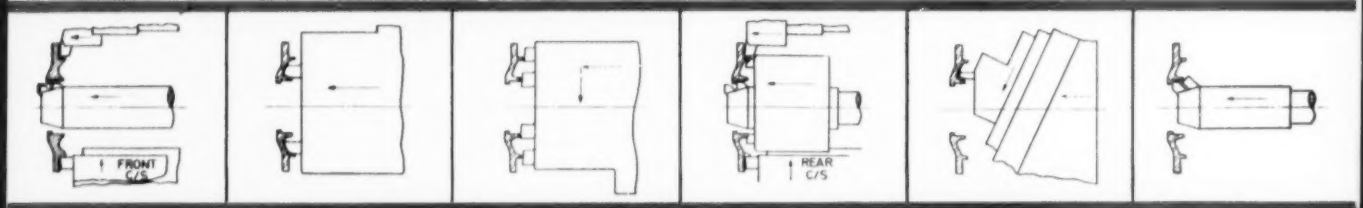
The combination of a 2F Fastermatic Automatic Turret Lathe and excellent tooling did the trick—with the entire job handled in one chucking.

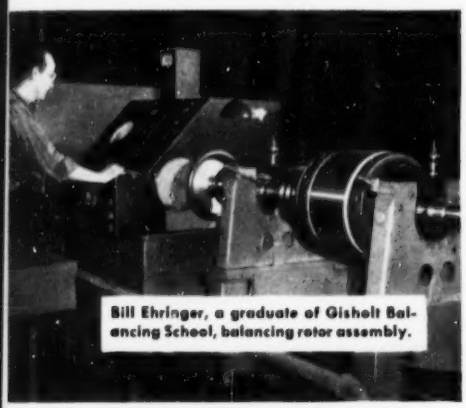
The drawings show how all six stations of the turret are used. Also, the front and rear independent cross slides. All roughing and finishing operations are completed in 4.5 minutes, floor-to-floor.



This Fastermatic performs repetitive machining on 10 surfaces with exacting precision...all in one simplified, automatic operation. All the operator does is load and unload.

Fastermatic setup for machining support rings.





Bill Ehringer, a graduate of Gisholt Balancing School, balancing rotor assembly.

BALANCING ADDS LIFE TO P&H CRANE MOTORS

Better Service Assured by Machine that Locates, Measures Unbalance

Uninterrupted service is a must with users of overhead cranes. "No service" can mean no production.

Harnischfeger Corporation, Milwaukee, leading manufacturer of cranes, goes all out to protect its customers...giving vital electrical components added "life insurance" by precision balancing.

The required correction on this 300 lb. rotor assembly is read directly from the meter on the Gisholt Type U DYNETRIC Balancer. With the amount and location of unbalance determined, a length of solder corresponding to the amount indicated on the machine is metered out and added to the banding wires—while the part is still in the machine.

The results? Increased service life of rotors and armatures, less maintenance, more efficient operation. The Balancer also handles couplings, clutches, fans, etc.

Unbalance in a variety of parts is located, measured and corrected—all without removing parts from machine.

Ask for your copy of "Static and Dynamic Balancing." It has up-to-the-minute facts on balancing.

DYNETRIC BALANCERS GISHOLT

No. 5-653
608

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

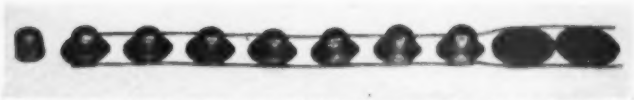
THE JOBS PROVE IT

YOU RETRENCH ON STAMPING COSTS WITH HENRY & WRIGHT DIEING MACHINES

In the small area occupied by a compact Henry & Wright Dieing Machine you have a production tool equal in capacity to five or ten conventional presses. Progressive stamping on a Henry & Wright really pays off, because this press is specifically designed for this type of work.

Angular thrust is not transmitted to the upper crosshead. Low center of gravity holds vibration to an absolute minimum. Long ways, plus four post guidance and a pulling instead of pushing stroke, serve to strait-jacket punch travel. Accurate punching produces high quality work and a lot more of it between die grinds. Much less metal is removed when dies are ground.

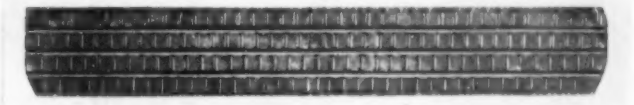
Get the whole story about the Henry & Wright Dieing Machine – the economies you achieve in die life, inspection, toting, operators. Retrench by modernizing with Henry & Wright.



Refrigerator part produced at speed of 65 strokes per minute of .060" cold rolled steel on 100-ton Dieing Machine.

Hemispherical shell 2" deep produced at speed of 60 strokes per minute.

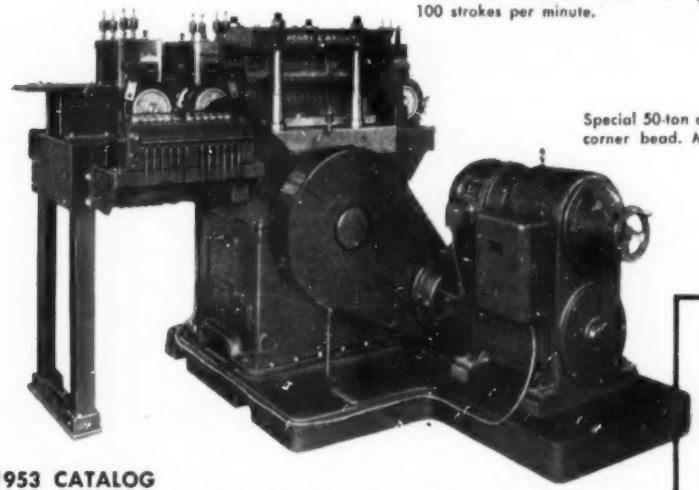
Paired sections of housing produced of .065" hot rolled steel at 60 pairs per minute.



Radiator fin of copper made three at a time at speed of 85 strokes per minute.

Radio part produced one per stroke at speed of 300 strokes per minute.

Brake lever made on 150-ton Dieing Machine operating at speeds in excess of 100 strokes per minute.



Special 50-ton dieing machine for production of expanded corner bead. Machine operates 620 strokes per minute.

1953 CATALOG

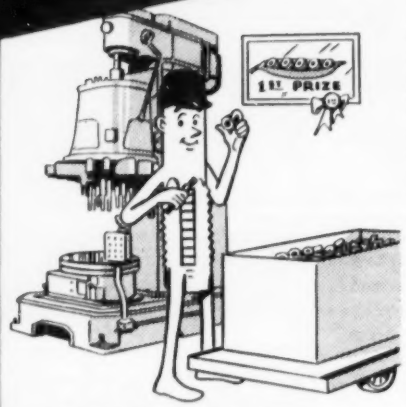
Write for your copy on company letterhead to Henry & Wright, Division of Emhart Mfg. Co., 481 Windsor St., Hartford, Conn.

HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

Only the best is good enough

TAP-ODDITIES



Bath Taps are "tops" on long runs,
Pete sez — "they've got the guts".
When parts look like "peas in a pod" —
Believe me — it's the NUTS!

At home — Pete rigged this gadget
For all his "dolls and guys".
They'll fight no more for do-nuts
Since the holes are tapped to size.

A Bath Tap produced 160,000 malleable iron union ring nuts at a surface speed of 120 feet per minute.

That's the kind of high speed tapping production that puts you "in the dough".

On long runs, uniform work depends upon the uniformity of the taps themselves.

Bath Tap manufacture is controlled . . . right from the start, when the blanks are scientifically hardened to an exact, uniform degree before thread grinding.

Special equipment and precision instruments guard production to the final operation . . . turning out these high speed taps like "peas in a pod".

Whether you require stock or custom built taps . . . you can depend on BATH TAPS for BETTER THREADS. And . . if you have a problem, a Bath representative will call, or write direct for engineering assistance.

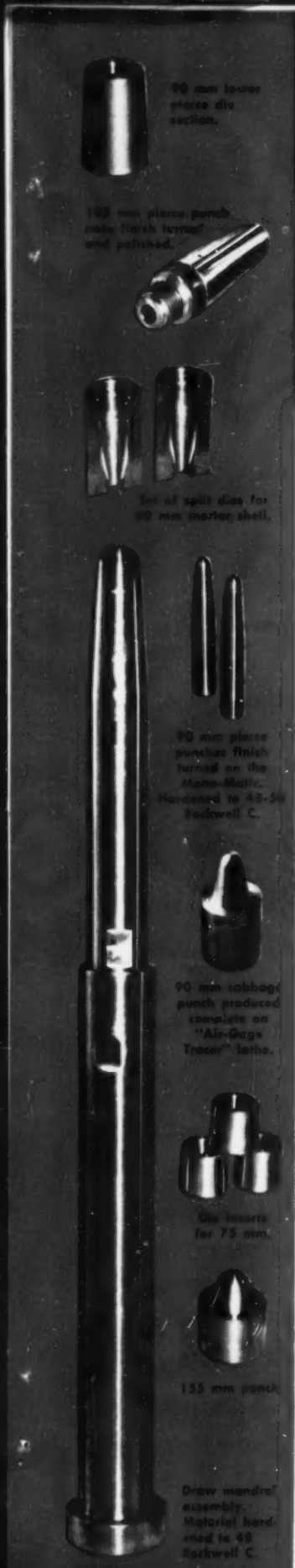
INSIST ON BATH TAPS
—PROFIT BY THEIR
PLUS—PERFORMANCE

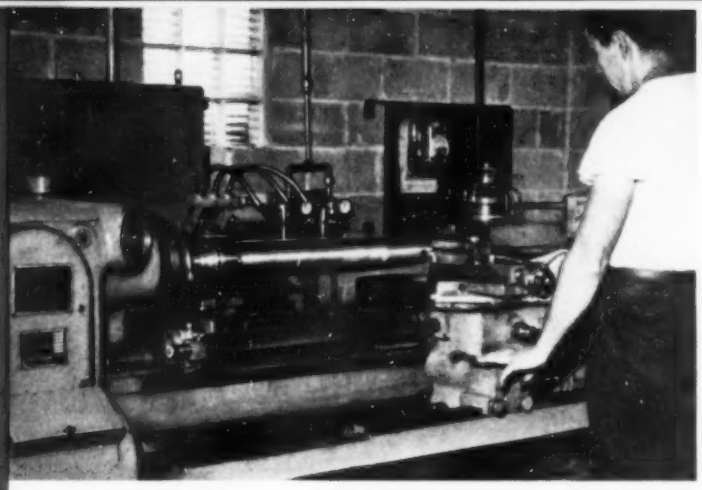
JOHN BATH CO. INC. · WORCESTER · MASS

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED

22 Grafton St., Worcester, Mass.

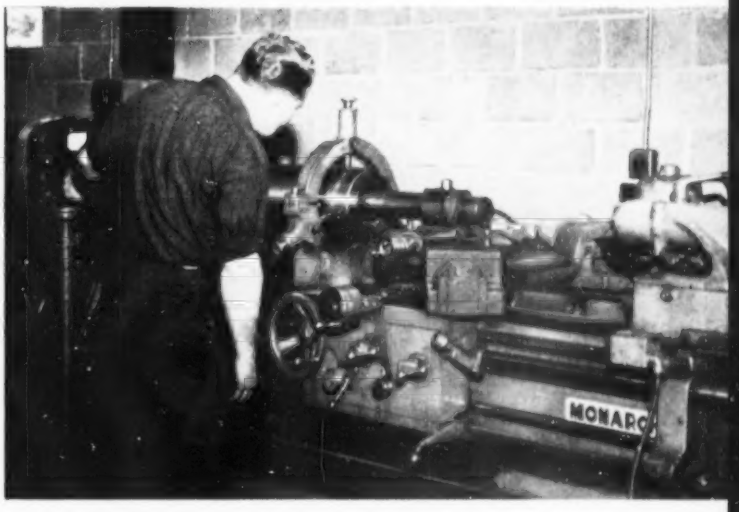

90 mm lower pierce die section.
105 mm pierce punch nose finish turned and polished.
Set of split dies for 90 mm mortar shell.
90 mm pierce punches finish turned on the Mona-Matic. Hardened to 43-50 Rockwell C.
90 mm cabbage punch produced complete on "Air-Gage Tracer" lathe.
Die inserts for 75 mm.
155 mm punch
Draw mandrel assembly. Material hardened to 48 Rockwell C.



Rough turning draw and pierce mandrels on the Mona-Matic. Sizes include 90, 105 and 120 mm shell. Material is hot work die steel. Billets often weigh up to 210 lbs. Depth of roughing cut is up to 5/8" on side representing a saving of 3 hours per piece over conventional engine lathe procedure. Finishing cut is taken after heat treatment.

Monarch Air-Gage Tracer Scores

GRAND SLAMMO ON THE AMMO



Contour boring die liners on a Series 60 using a 30" long boring bar. Material is a forged hot work die steel billet 10" O.D. x 20" long. Total tolerance held is .002" to .003". The "Air-Gage Tracer" method saves up to 6 hours per piece.

Just put these two facts together. **(1)** More hot forged tooling for the shell program is produced by the Diversey Engineering Co. (Franklin Park, Illinois) than by any other plant. **(2)** The turning equipment is exclusively Monarch, with every machine — Mona-Matics, Series 60's, and Heavy Duty lathes — Air-Gage Tracer controlled. Some of these are swiveling types with Auto Cycle Unit. Here, more of these lathes than in any other shop doing similar work, produce on a 24-hour-a-day, 7-day-a-week schedule.

Significance? This equipment delivers a 200% increase in production compared with less modern methods generally employed. Its dependability is such that no shell line in the country depending on Diversey hot forged tooling has failed to keep moving.

This manufacturer currently has on order 6 additional machines—all sold by the performance of present equipment. Why not take a tip from Diversey and load up with production ammunition like this for yourself? Just fire us a request for our complete Air-Gage Tracer Booklet No. 2606 . . . *The Monarch Machine Tool Co., Sidney, Ohio.*

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

for a Good Turn Faster
. . . Turn to Monarch

full course or short orders

with a

LODGE & SHIPLEY COPYMATIC

What's on your lathe work "menu"?

"Short order" limited runs, 5 or 25 pieces?

"Full course" turning production, 500 or more pieces?

Or both? Here's the lathe that satisfies any production "appetite."

For example, Leland Electric Co., Division of American Machine & Foundry Co., finds the COPYMATIC "the answer to short order lathe turning . . . saves 8 hours per day . . . 1 man's salary per year!" On large runs, users report production increases up to 536%.

Reports on jobs comparable to yours are available in case histories together with NEW descriptive Bulletin No. 675. Write for your copies.

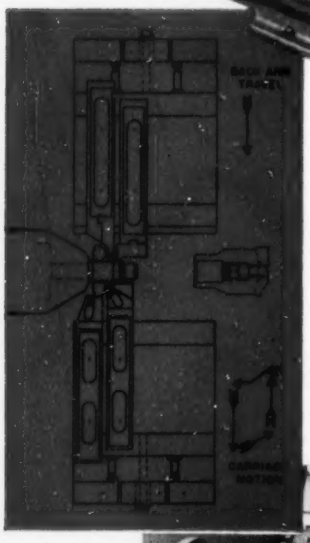
THE **Lodge & Shipley** COMPANY

3059 COLERAIN AVE., CINCINNATI 25, OHIO

AUTOMATICITY BACKS UP HIGH VELOCITY TURNING ON FAY AUTOMATICS

SIDE GEARS
18 Seconds Floor to Floor — 635 SFM

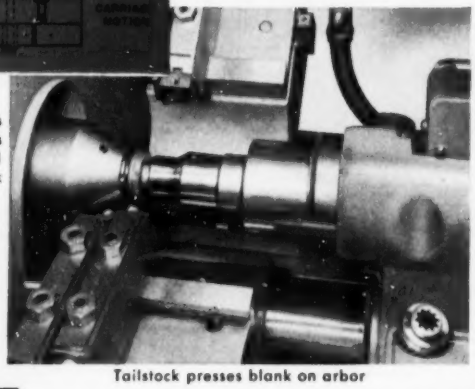
Two 8" Fays, with Automatic Sequential Control, machine all exterior surfaces of the blanks in two operations; one machine for each. The major diameter is 2-15/16" and floor to floor time is approximately 18 seconds in each operation.



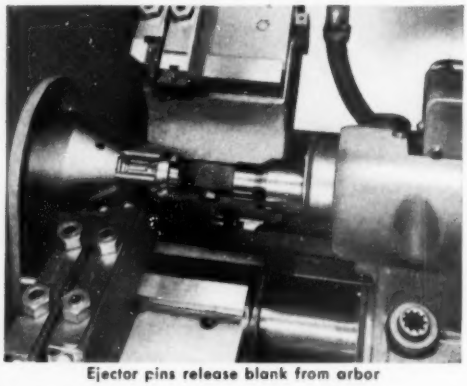
Automatic Cycle—The machines are equipped with automatically operated splash guards and automatically air-operated tailstock rams for pressing the blank onto a splined arbor equipped with automatically operated ejector pins.

The operator places the blank on the end of the arbor, and pushes the cycle start button. *Automatically, the guard closes, the tailstock ram presses the piece onto the arbor and then retracts. The carriage turns, the back arm faces, and at the end of the cuts, ejector pins push the piece onto the loading section of the arbor* from which it is removed manually.

FIRST OPERATION: Note intricate movements of the carriage, which turns the hub, back angle and major diameter. The back arm faces and forms.



Tailstock presses blank on arbor



Ejector pins release blank from arbor

Production management regularly relies upon the engineering services of Jones & Lamson for the latest information on methods, costs, tooling and performance. Why not consult us about YOUR *turning, threading and inspection problems.*

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

FAY LATHE DIVISION

New Thompson AUTOMATIC double wheel TRUFORM Grinder speeds jet engine production

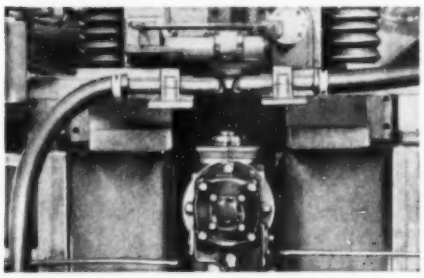
GRINDS BOTH SIDES OF JET TURBINE BUCKETS OR BLADES SIMULTANEOUSLY IN A SINGLE SETTING

To grind root sections on gas turbine buckets with greatest accuracy and productivity, Thompson developed this new AUTOMATIC double wheel TRUFORMING machine featuring simultaneous grinding of both sides of root section with one setting of work.

Grinds rough to finish in 110 seconds . . . or 30 buckets per hour

Hood doors, work clamps, coolant flow, grinding and crushing cycles are actuated in automatic sequence on the new Thompson AUTOMATIC double wheel TRUFORM Grinder.

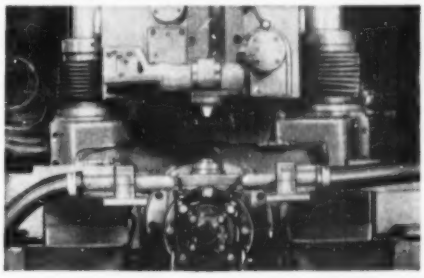
On a bucket having 2" length of form similar in design to the one in the diagram above with .150" stock removal per side from rough to finish size, production is 30 buckets per hour at a steady day after day rate. This includes down time for dressing, regrinding the crusher roll, initial machine warm up period, wheel changing and diamond changing. Actual machine time from rough forging or casting to finish is 104 seconds plus 6 seconds for loading and unloading time . . . makes total time floor to floor 110 seconds per piece.



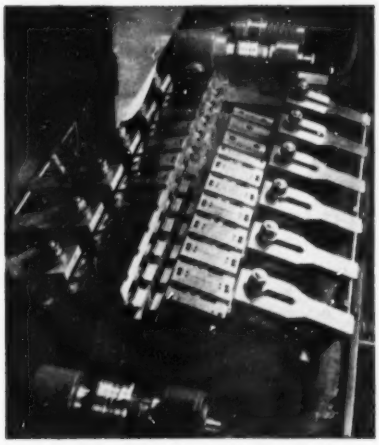
FOR ABSOLUTE SYMMETRY BOTH WHEELS ARE DRESSED FROM A SINGLE CRUSHER ROLL

GRINDING POSITION

CRUSHING POSITION

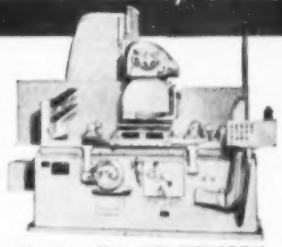


Standard THOMPSON TRUFORM Machines also grind jet buckets faster, better



By means of multiple grinding of jet turbine buckets the standard TRUFORM Grinders still offer high production plus many advantages such as flexibility of standard machine design and lower first cost. Although compared to the new AUTOMATIC the standard TRUFORM requires more skillful set up and tooling.

Typical tooling on Type "C" TRUFORM producing 24 buckets per hour. Type "B" TRUFORM produces 18 parts per hour.

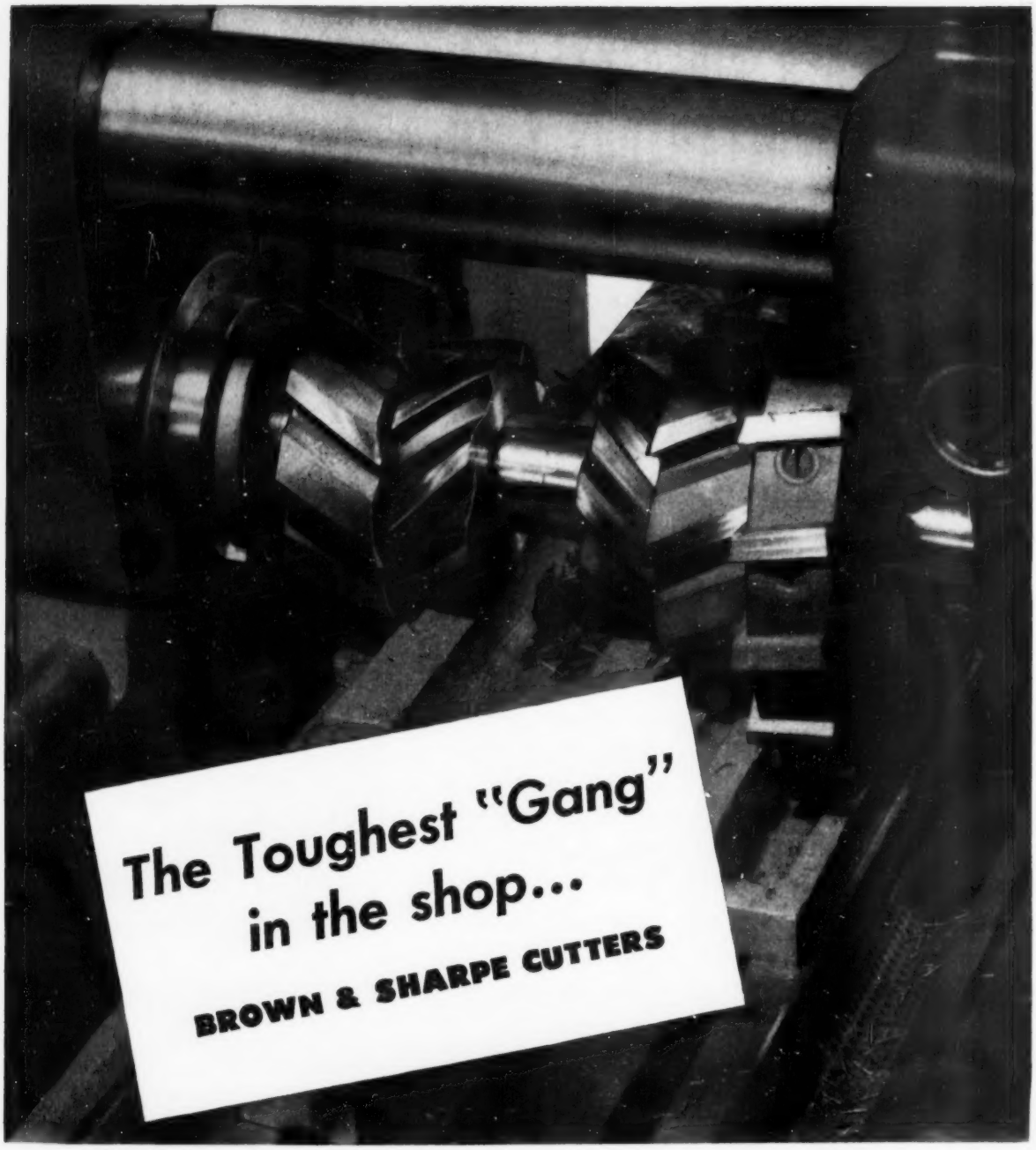


Thompson Type "C" TRUFORM

FOR COMPLETE DETAILS WRITE TODAY

The Thompson Grinder Co.
Springfield, Ohio

Thompson SURFACE Grinders



Users everywhere have proven for themselves that Brown & Sharpe Cutters can "take it" . . . that they "stand-up" under the higher speeds and feeds of modern production milling. That's why more shops prefer them. They're expertly made from the finest steels and available in a broad selection of types and sizes, including a complete line of end mills. Write for illustrated Catalog to assist you in ordering.

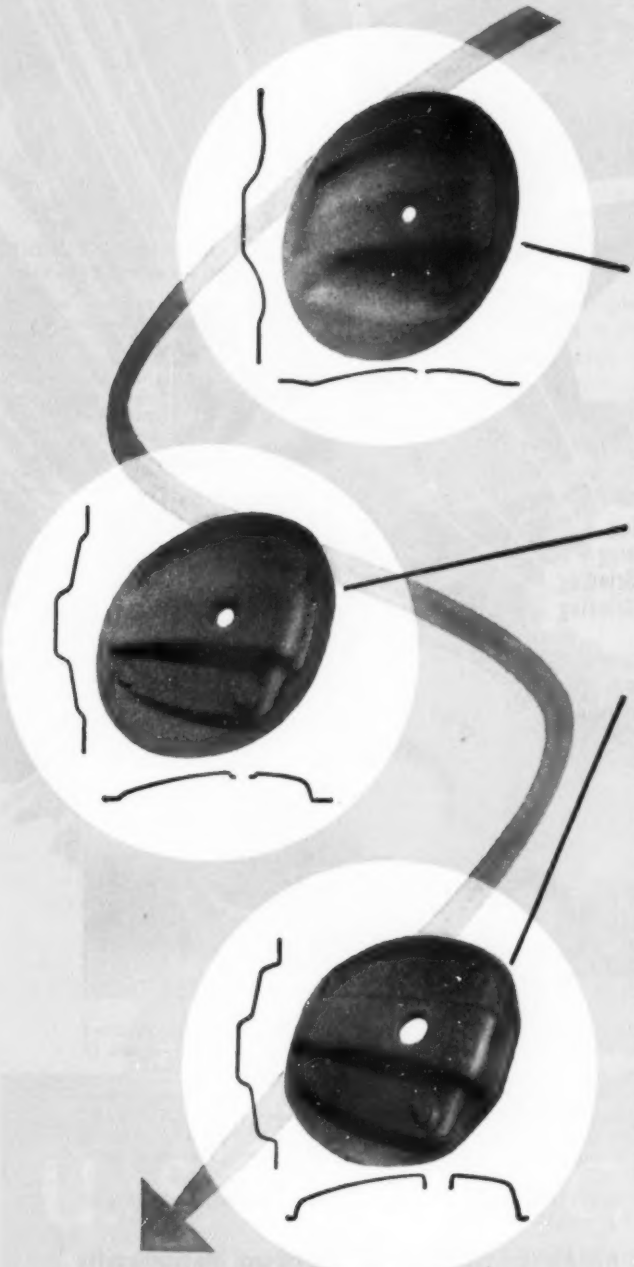
Brown & Sharpe Mfg. Co.,
Providence 1, R. I., U.S.A.

BUY THROUGH YOUR LOCAL DISTRIBUTOR

Brown & Sharpe B·S

the ABC of improved deep drawing: Absolute Blank Control

...and only the Hydroform has it!



ONE CONTINUOUS DRAW

Solid lines below and to the left of each view represent the horizontal and vertical sections on centerline at that point in the draw.

Shown are three views of *one continuous draw* —the Hydroforming of an appliance base from a 12″ blank of .074″ cold rolled steel. Hydroforming permits stopping the forming action and examining the part at any point in the draw.

Note, in the initial phase of the draw, that the Hydroform's flexible die member holds the outer edge of the blank flat on the draw ring, yet causes the center area of the blank to move quickly into contact with the punch ahead of the draw. This is the result of the complete blank control provided by the Hydroform and is not obtainable in conventional dies.

As the draw progresses, the material continues to be formed to the contour of the punch. That portion of the blank previously formed has been clamped to the punch surfaces, preventing further stretch or thin-out.

At the end of the stroke, high pressure and the edging control feature combine to finish form the part, complete with extruded hole and sharp flange radius, in this single drawing operation.

These illustrations show the Hydroform's infinite, accurate control over the blank during the entire (single) drawing action. The material is made to "hug" the punch progressively throughout the draw. With absolute blank control, Hydroforming makes possible more complex forming and deeper drawing in a *single* operation than conventional methods allow. Plan now to invest in new methods for cost reduction and product improvement. Investigate Hydroforming! Call in a Cincinnati Milling field engineer. For a description of the *five* sizes of Hydroform machines, write for Bulletin M-1759-2.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U.S.A.

Hydroform

POWER . . .

FROM THE "GROUND" SURFACE UP!

It Takes Lots of good grinding to produce such a rugged earthmover as this Caterpillar No. 6 Shovel

for Example:

PRECISION GRINDING { Valve Grinding, Cylinder Honing, Crankshaft Grinding, Cylindrical Grinding

and

HEAVY STOCK REMOVAL { Weld Grinding, Snagging

BAY STATE

BAY STATE SALUTES CATERPILLAR TRACTOR CO. . . . for brilliant design in this No. 6 shovel. Here indeed is a remarkable achievement of surging power with maximum compact maneuverability.

Each day, BAY STATE abrasive products play important parts in producing up-to-the-minute mechanical triumphs such as this. Each day too, more manufacturers are realizing the tremendous faith they can place in BAY STATE'S complete line of abrasive products and its excellent engineering service.

Call your BAY STATE distributor for the solution to any problem that involves your production grinding.

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Massachusetts

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All principal cities
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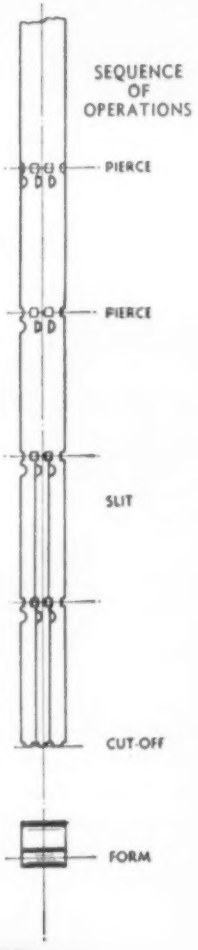
MANUFACTURERS OF ALL TYPES OF QUALITY GRINDING PRODUCTS

ON THIS TOP QUALITY HIGH-PRODUCTION JOB .

No. 28 U.S. MULTI-SLIDE® PAYS FOR ITSELF IN 11 WEEKS!

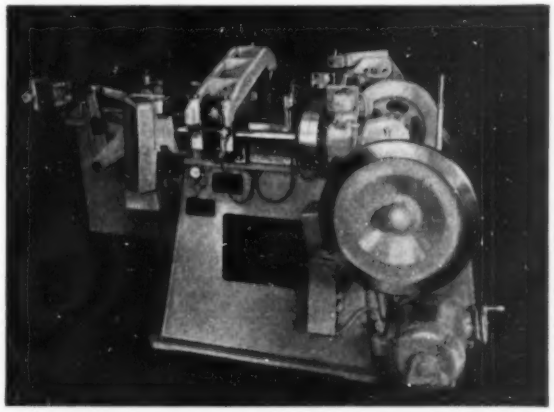
ILLUSTRATING THE VERSATILITY OF THE U. S. MULTI-SLIDE 600 PARTS PER MINUTE

The part illustrated at top, right is produced in a No. 28 U. S. Multi-Slide Machine from .016" thick phosphor bronze, and the sequence of tooling is shown in the drawing at the right. The finished part is 3/16" wide, and the material fed into the machine is 9/16" wide. This strip is sheared into three strips, from each of which a part is produced. The Multi-Slide runs at 200 strokes per minute, resulting in a production of 600 finished pieces per minute. On this job, the user wrote off an investment for a No. 28 Machine complete with tools in 11 weeks! Possibly you have similar jobs in your plant where the use of U. S. Multi-Slides will result in equivalent savings.



The design of many metal parts is such that they are particularly adaptable for production in multiples (2, 3, or even 4 at a time) in the U. S. Multi-Slide resulting in savings in material and increased production. The part shown above and the drawing at the left illustrates but one of the many different types of parts which can be produced in this manner. In all cases, the width of the material which is fed into the U. S. Multi-Slide Machine is an exact multiple of the width required for one part. The material is sheared in the machine into 2, 3, or 4 individual strips (depending on the design of the part) and one piece is produced from each strip at each stroke of the machine. On this type of operation the machine is arranged with a Positive Rear Knockout that maintains the individual strips in line after shearing, and prevents interference during the feed stroke.

Bulletin No. 15-A contains complete specifications of four sizes of U.S. Multi-Slides. Write for your copy—there's no obligation.



No. 28 U.S. Multi-Slide. Stock capacity, 1½" wide; feed length, 8". Overall size, 40"x50"x 80". Weight, 2600 lbs.

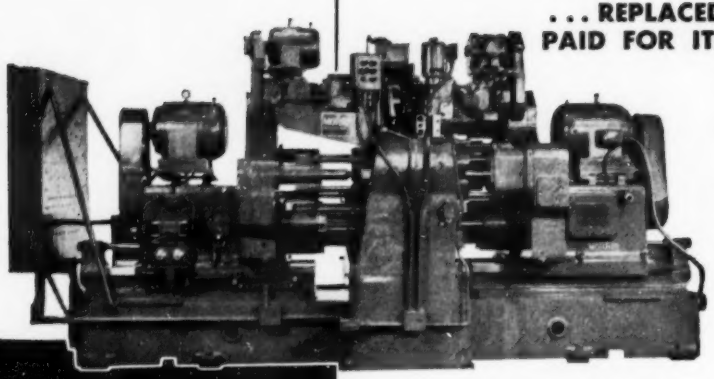
U S PRODUCTS

U. S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides-U. S. Multi-Millers
U. S. Automatic Press Room Equipment-U. S. Die Sets and Accessories

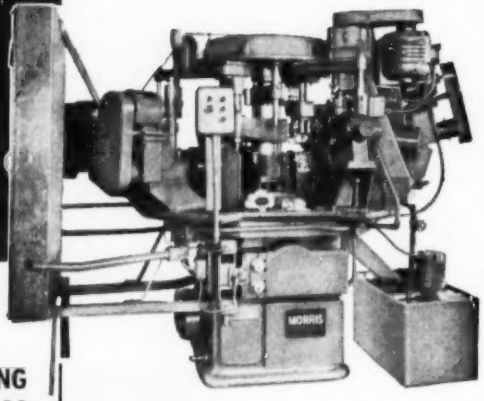
. . . REPLACED 6 OLD MACHINES PAID FOR ITSELF IN 39 WEEKS!



Thirty-eight drilling, reaming, countersinking, radius forming and tapping operations are performed on refrigeration parts by this Two-Way Horizontal, Eight Station Automatic Indexing Machine. Production rate is 150 pieces per hour at 80% efficiency.

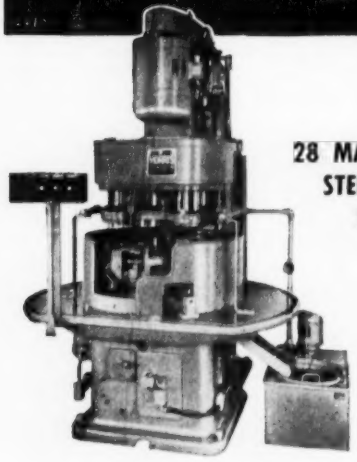
Want PRECISION PRODUCTION LIKE THIS?...

. . . 300 PIECES PER HOUR!



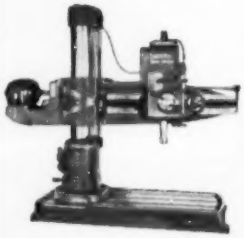
Either right or left hand carburetor air horns are drilled, faced and tapped . . . 22 operations . . . at a production rate of five per minute on this Six Station, Vertical Center Column Machine.

28 MACHINING STEPS IN 18 SECONDS!



Drilling, countersinking and reaming torque converter pump hubs, this Six Station Automatic Indexing Machine turns out 200 pieces per hour for a noted auto manufacturer.

Eliminate multiple handling and multiplied cost in multiple drilling, reaming, tapping and similar operations with Morris MOR-SPEED Production Machines. Morris Engineers will gladly prove that high precision production can be yours . . . with worth-while savings in time, labor and space. Write for additional details.



Morris also builds a line of 9 and 11 inch Column Radial Drills with outstanding features contributing to easy operation, sustained accuracy and long service life. Catalog on request.

Canadian Representatives:
THE JOHN BERTRAM & SONS CO., LTD.

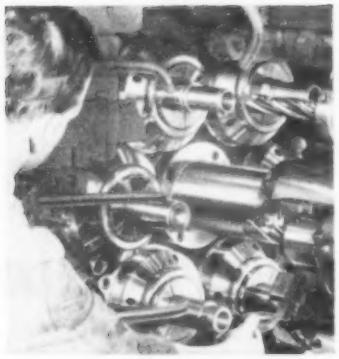
Builders of MOR-SPEED Line

"A better product at less cost—with PRODUCTION plus PRECISION"

THE MORRIS MACHINE TOOL COMPANY

933 HARRIET ST., CINCINNATI 3, OHIO

No. 1 in a Series



"He who makes no mistakes does nothing"

In a supposedly modern era it is sometimes claimed to be "smart business" to let a competitor take the lead and make profit from his mistakes. Obviously, if all business adhered to such a philosophy there would be no progress, if any business. "He who makes no mistakes does nothing". Cone leadership was founded — and is maintained — by active service, by doing things.

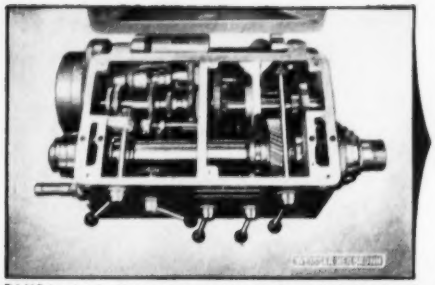
The Conomatic Carbide Development program expects to make a few mistakes. But, loss or gain, its efforts will contribute to the general benefit of all "automatic" users, users on whom all "automatic" builders are dependent.

The job illustrated compares actual production runs with HSS and 100% carbide tooling. It suggests the kind of pioneering that is being done at Cone. Full details are available.

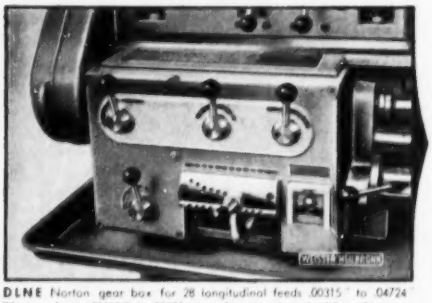
MATERIAL—1112 STEEL: Hole drilled with 1" dia. drill to 2¼" depth. OD threaded to 2" length with 1¼"—12 chasers.

	HSS	CARBIDE
Cycle Time	90 secs.	15 Secs.
Work Spindle Speed	370 R.P.M. at 103 S.F.	1500 R. P. M. at 417 S. F.
Tool Wear	1500 pcs. per grind	5000 pcs. per grind

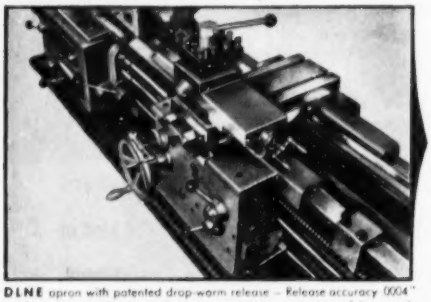
Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



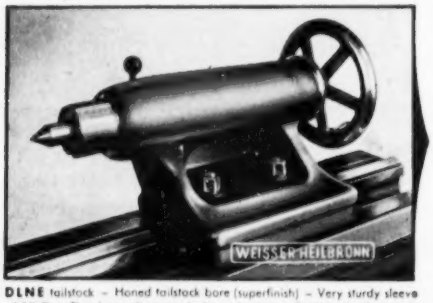
DLNE headstock with opened cover – Very sturdy spindle, hardened and lapped at bearing points – All gears and sliding wheel shafts of chrome nickel alloy steel, hardened and precision ground.



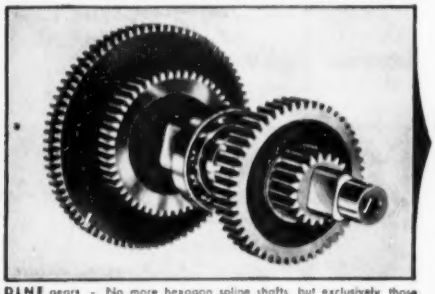
DLNE Norton gear box for 28 longitudinal feeds .00315" to .04724" – 28 cross feeds .00118" to .01890" – 42 metric threads, 0.5 to 56 mm – 43 Whitworth threads, 2 to 28 threads per inch – 26 modulus threads 0.25 to 14.0 – 66 diametral pitch threads 1 to 112. Gears need only be shifted for modulus and diametral pitch thread cutting.



DLNE apron with patented drop-worm release – Release accuracy .0004" – Cross slide provided with T grooves permitting mounting of form tools and cutting-off tools.



DLNE tailstock – Honed tailstock bore (superfinish) – Very sturdy sleeve of 3" Ø – The sleeve shows an inch graduation to facilitate boring work.



DLNE gears – No more hexagon spline shafts, but exclusively those with patented triangle Ⓐ profile. This makes displacing of wheels impossible while machine is running, prevents gear breaks and extends lifetime of lathe.

Increase your production

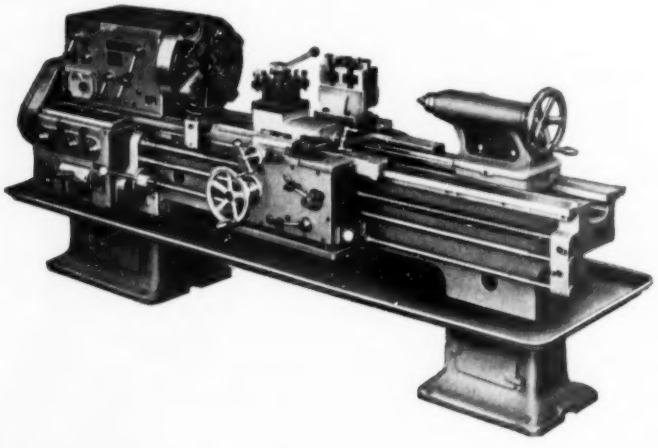
by use of the

HIGH EFFICIENCY HIGH SPEED LATHE

MODEL DLNE

7 advantages bound to increase your output:

1. Bed with diagonal ribbing; rigid structure; good chip flow.
2. Full protection against accidents thanks to safety devices. Face plate, chuck and dog plate equipped with slip safety device.
3. Largely dimensioned slide bearings of approved special bronze – Dimensions of front bearing 4" Ø × 6¼", of rear bearing 3⅞" Ø × 5⅛".
4. Hardened and precision ground gear wheels guarantee quiet running and excellent surface of turned work.
5. Norton gear box for 177 standard metric, Whitworth, modulus, and diametral pitch threads; coarse and multiple thread cutting attachments.
6. Patented apron with automatic release of longitudinal and transverse feed effected through micrometer stop guarantees a release accuracy of .0004". No recoiling of carriage when feed is released, therefore no tool breaks.
7. Carriage spindle adjustable backlash-free by means of spindle nut.



Representatives and Service:

USA: Guthery Machine Tool Corp., 130 West 42nd Street, New York 36, N. Y. Telephone CHickering 4-2820.

Canada: Transocean Machine Company Inc., 267 Dunbar Avenue, Montreal 16, P.Q. Telephone REgent 3-5373

WEISSER HEILBRONN

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HEILBRONN/NECKAR (Germany)

Werkzeugmaschinenfabrik – Salzstrasse 79/83 a. 128/130

COMPLETE VARIETY OF

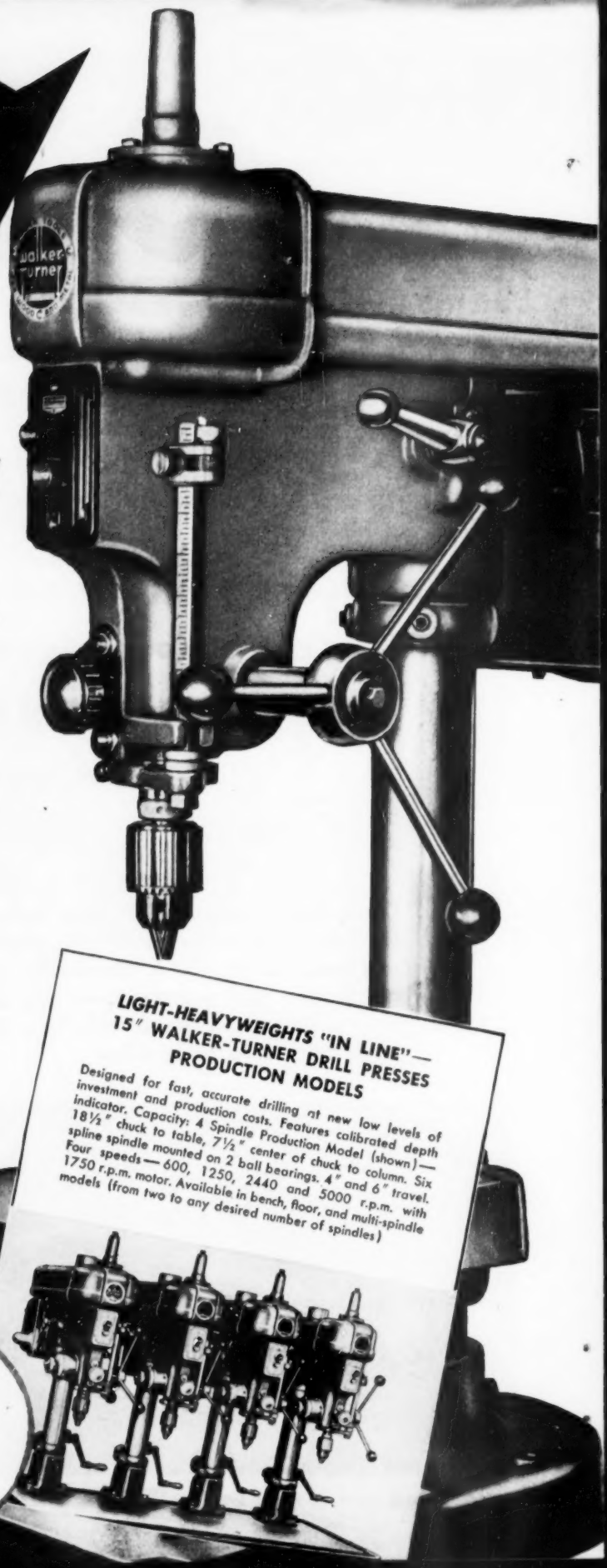
SIZES AND LENGTHS IN

UNIVERSAL SUPER FINISHED DRILL BUSHINGS

Check these features that make Universal drill bushings outstanding: 1. Super finish reduces wear to a minimum. 2. Blended radius reduces tool hang up. 3. 100% concentricity and hardness tests assure accuracy. 4. Knurled head provides quick sure grip. Order from the office nearest you ... 1060 Broad St., Newark, N.J., 5035 Sixth Ave., Kenosha, Wis., or write direct to our home office.

Design with a $ sign—

(for savings in initial cost)



the new WALKER-TURNER

LIGHT-HEAVYWEIGHTS Drill Presses

This is an entirely new *class* of machines Walker-Turner has engineered. *Light-heavyweights.* For jobs where neither the capacity nor the expense of a large radial drill is warranted. Yet where the "hobby power tool" would be inadequate. In shipping and packing rooms, for example . . . in pattern and maintenance shops.

The new Walker-Turner Light-Heavyweight line gives industry the capacity for short-run production work, without the necessity of heavy investment. It's design with a dollar sign, representing money saved. Walker-Turner makes 15″ and 20″ Drill Presses (in Bench, Floor, and Production models), as well as Radial Drills. Send for complete information. Simply write name and address in margin below.

WALKER-TURNER
walker-turner • DIVISION •
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

DRILL PRESSES — Hand and Power Feed • RADIAL DRILLS • Wood and Metal Cutting BAND SAWS • TILTING ARBOR SAWS • RADIAL SAWS JIG SAWS • LATHES • SPINDLE SHAPERS • JOINTERS • BELT and DISC SURFACERS • FLEXIBLE SHAFT MACHINES

SOLD ONLY THROUGH *TRAINED* INDUSTRIAL DISTRIBUTORS

LIGHT-HEAVYWEIGHTS "IN LINE"— 15″ WALKER-TURNER DRILL PRESSES PRODUCTION MODELS

Designed for fast, accurate drilling at new low levels of investment and production costs. Features calibrated depth indicator. Capacity: 4 Spindle Production Model (shown)— 18½″ chuck to table, 7½″ center of chuck to column. Six spline spindle mounted on 2 ball bearings. 4″ and 6″ travel. Four speeds — 600, 1250, 2440 and 5000 r.p.m. with 1750 r.p.m. motor. Available in bench, floor, and multi-spindle models (from two to any desired number of spindles)

Use this space

to write for full details and specifications.
Walker-Turner Division, Kearney & Trecker Corp.
Dept. AM-6, Plainfield, N. J.

(Please write your name and address in margin of page)

1949's BIG NEWS IN METALWORKING WAS THIS:

"METALWORKING HAS MORE OLD PRODUCTION EQUIPMENT THAN EVER BEFORE

obsolescence trend is sharply UP!"*

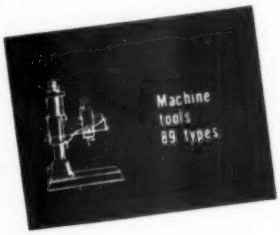
*from the American Machinist Mid-Century Inventory of Metalworking Production Equipment—published November, 1949

What will the facts show this year?

Coming in the 1954 PRODUCTION

. . . the 1953 American Machinist Inventory of Metalworking

bringing you all the up-to-date facts on:



1. How much production machinery and equipment Metalworking now employs (165 major types)
2. How old it is (amount under 10, at least 10, and over 20 years old)
3. Where it is (15 manufacturing divisions of Metalworking and 24 major manufacturing areas)

When *American Machinist's* Mid-Century Inventory of Metalworking Production Equipment was published in November, 1949, all of Metalworking was startled at the very big, and growing, amount of overage machinery and equipment in its production shops. Forty-two per cent of the more than three million major production units then in place were over 10 years old. In late 1949, almost all metalworking companies were faced with tough competition in a buyer's market . . . and many of these companies were ill-equipped, production- wise, to meet it.

Since 1949, Metalworking has invested billions in new plant and equipment . . . and raised production by 81% to meet the demands of both rearmament and growing consumer markets.

And now, in 1953, competition is growing fast again . . . and as metalworking production executives plan ahead, the big question is:

"How well prepared are we to produce successfully for increasingly competitive markets?"

Next November, you and all other *American Machinist* subscribers will *know* the answer. For *American Machinist's* new Inventory of Metalworking Production Equipment will give you a crystal-clear, detailed, nation-wide picture of the *number and age* of all major production machines, and other equipment, currently operating in Metalworking's production shops.

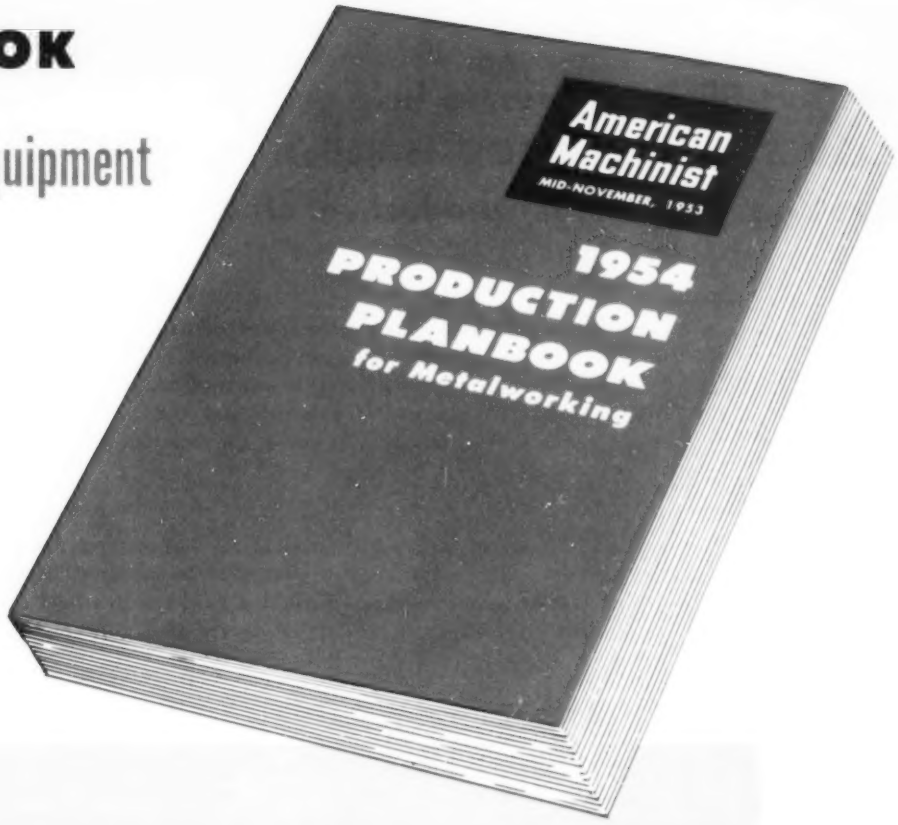
With this invaluable data, you can quickly check the competitive efficiency of *your* production lines, in comparison with those of all other metalworking plants.

This seventh of *American Machinist's* famous Inventories will be your basic guide to how much, and what kinds, of machinery and equipment in your shops needs to be replaced. Other PRODUCTION PLANBOOK features will give you still further, and very specific, help in making your plans for today ***and*** tomorrow.

It all adds up to this: the PRODUCTION PLANBOOK promises to be the *most helpful, long-useful* issue of a magazine ever to come your way.

PLANBOOK

Production Equipment



Many other important features in this first *Annual* PRODUCTION PLANBOOK . . . and they will come to you in Mid-November as part of your regular subscription to *American Machinist*

You will find these other, and very important, features briefly described on the next page, and we feel sure you will quickly sense how useful each will be to you.

Right now, however, we want to remind you that the PRODUCTION PLANBOOK will be a *continuing addition* to *American Machinist*'s editorial services to you. (See the first announcement of the PRODUCTION PLANBOOK in the May 25th issue of *American Machinist*.) A new PRODUCTION PLANBOOK will now come to you each year, in November, and will be included as part of your regular subscription to *American Machinist*.

These PRODUCTION PLANBOOKS will not obsolete each other, but will add, each year, new and basic information to that contained in preceding issues. We want to urge you now, therefore, to look forward to the 1954 PRODUCTION PLANBOOK as a *permanent addition* to your library of facts on how to plan for more efficient production. Take good care of your copy when it reaches you, because extra copies probably will not be available in other than very limited quantity.

In time, you can build a complete library of these annual PRODUCTION PLANBOOKS . . . and find within them your handiest and most useful guide to each year's most significant facts and developments in metalworking production.

also coming

these fact-filled features, to help you put the PRODUCTION PLANBOOK to fullest use in improving your shops' productive efficiency

THE ECONOMIC OUTLOOK

A comprehensive, statistical, informative roundup of the most important data on Metalworking's production accomplishments for 1953 and market outlook for 1954, interpreted for you by Editor Burnham Finney, with full cooperation from McGraw-Hill's Economics Department, and our nation-wide and world-wide News Bureaus. Made available to you at the time you are making your plans for the next year.

WHY AND WHEN TO MODERNIZE

A detailed and analytical presentation of the best methods for determining when the machinery in your shops can profitably be replaced. The MAPI Formula, as well as many other well-known and *new* guides to practical modernization and equipment replacement programs, will be detailed.

CASE HISTORIES OF SUCCESSFUL MODERNIZATION PROGRAMS

Five separate divisions of the PRODUCTION PLANBOOK will bring you case histories of successful machinery and equipment replacement programs . . . by a wide variety of metalworking companies. Operating costs before replacement. Reasons leading to a decision to install new equipment. Results obtained. Invaluable data for you here, sectionalized by case histories involving the following major types of machinery and equipment:

Machine Tools
Tools and Portable Tools
Presswork, Forging, and Forming
Inspection, Heat Treating, Welding and Assembly, Cleaning and Finishing
Materials, Components, Materials Handling, and Plant Services

PLUS:

Heavier covers + special binding + distinctive indexing of sections + sectionalized advertising + complete indexes to both editorial and advertising pages

How You Can Help Us

Very probably, a detailed questionnaire from our editors, requesting information about your production machinery and equipment for inclusion in the new Inventory of Metalworking Production Equipment, has already reached your company. If it has not, please write to us so we can send you another copy. Your prompt co-operation in completing it will help us both. All information supplied by you will be held in strictest confidence as to its source. Your help is needed to make this new Inventory as complete as possible.

What to do if you are not an American Machinist subscriber

If you are not a personal subscriber to American Machinist, and want to make sure you do not miss the 1954 PRODUCTION PLANBOOK, enter your personal subscription to American Machinist now. You can do so easily by writing to us at the address below. In addition to giving us your name, address, and company title, give us your company's name, principal products manufactured, and number of employees. You can't make a sounder investment than the 26 regular issues, plus the PRODUCTION PLANBOOK, that your subscription to American Machinist will bring you each year.

now . . . more than ever . . . the top editorial force in Metalworking

The McGraw-Hill Magazine of Metalworking Production McGraw-Hill Building, New York 36

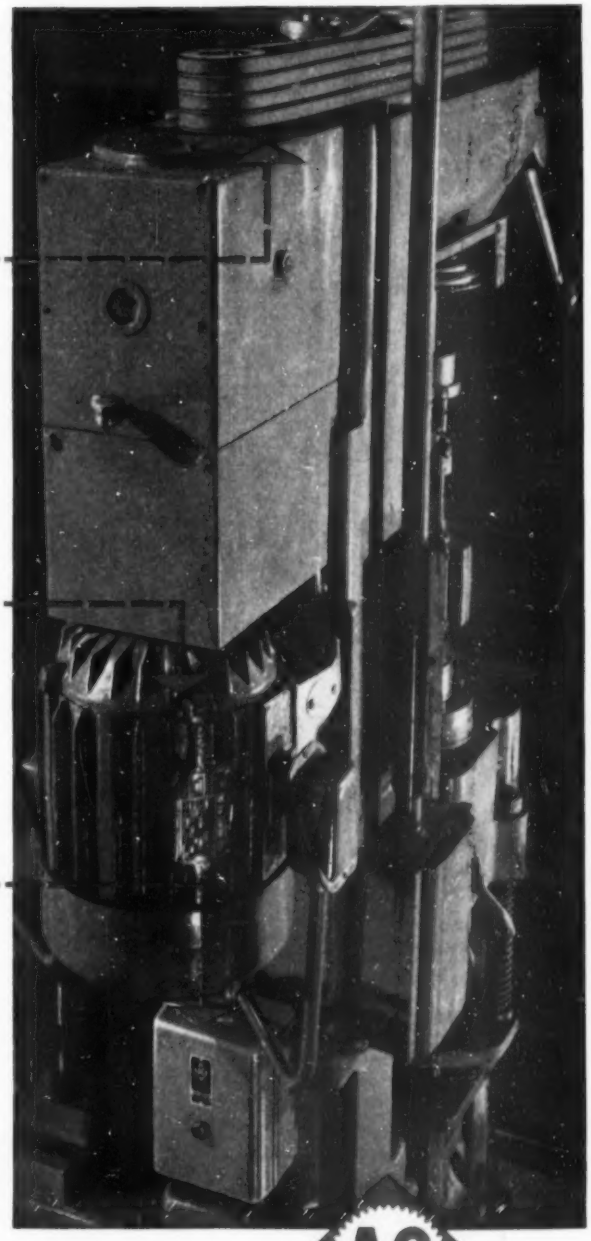
ABP ABC

American Machinist
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Designed to Work Together

Texrope Drives

Texrope V-belt drives, the original multiple V-belt drive, are available in a complete range of types and sizes, both fixed and variable speed. More and more machine designers are finding the moderate cost of *Vari-Pitch* sheaves is returned many times in increased machine versatility and more precise quality control. With either Stationary Control or Motion Control *Vari-Pitch* sheaves, speeds can be accurately adjusted quickly and easily over a wide range.



Motors

The increasingly high cost of maintenance labor has made the use of totally-enclosed, fan-cooled motors on machine tools more popular — and more profitable — than ever. This Allis-Chalmers TEFC motor is especially well suited to this application because it has no enclosed cooling air passages. Since all cooling surfaces are exposed, the motor is easy to clean with cloth, air or vacuum cleaner. Even with the oily atmosphere of many machine shops, dirt wipes off easily.

Motor Control

Allis-Chalmers motor control is available for most designers' applications from size 0 up. Allis-Chalmers builds many types of squirrel cage and wound rotor motor control, dc motor control and variable speed control for many applications. Shown here is a full voltage across-the-line starter with reset button.

Nation Wide Service

Nearly 100 Allis-Chalmers Certified Service Shops throughout the country provide factory-approved parts and service on Allis-Chalmers drive equipment. Complete information on special equipment also is provided.

Get the help of your Allis-Chalmers District Office representative on your drive plans. Call him or write for Bulletins 51B6052, 20B6051, and 14B7733. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4005

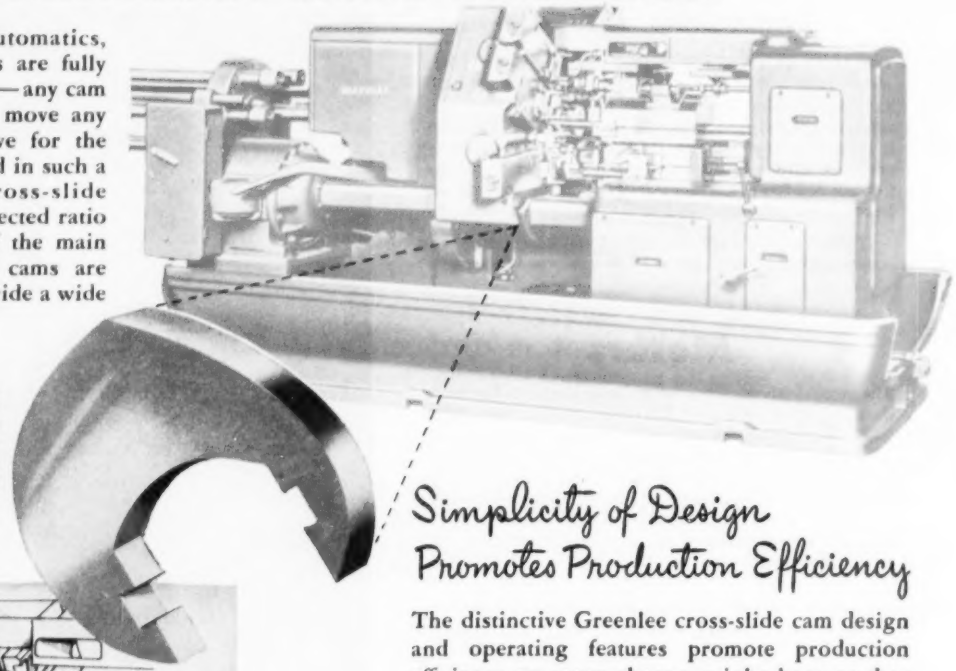
Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

GREENLEE *Automatics*

INTERCHANGEABLE CROSS-SLIDE CAMS

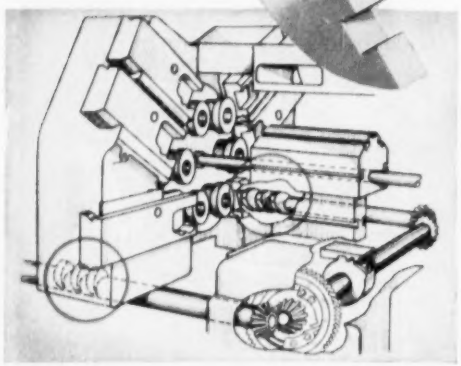
On Greenlee Automatics, cross-slide cams are fully interchangeable—any cam can be used to move any cross-slide. Drive for the cams is arranged in such a way that the cross-slide travel is in a selected ratio to the travel of the main slide. Standard cams are available to provide a wide range of ratios.



In the average job shop, a set of only 15 standard cams will provide enough flexibility to take care of 90% of the jobs that will come through. Standard ratios range from 1½:1 to 9:1.

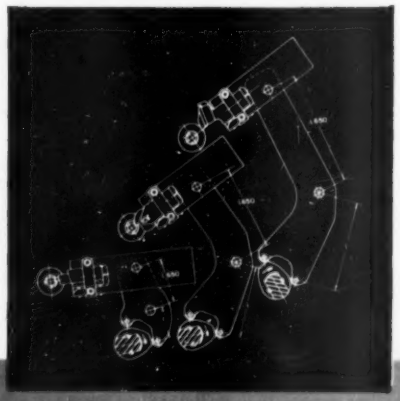
Simplicity of Design Promotes Production Efficiency

The distinctive Greenlee cross-slide cam design and operating features promote production efficiency on many short-run jobs because they reduce changeover time. In addition, there is an economy of investment.



As shown at the left, cross-slide cams are located at the sides of the machine, under the open ends of the cross-slide housings, where they are easily accessible.

As shown at the right, each cross-slide is operated independently by a separate cam, making it easier to split up operations and arrange better tooling set-ups.



Write for FREE Literature

PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO.
1726 MASON AVE., ROCKFORD, ILL.

1 Sectional view shows the sliding cam-carrier on shaft with cam and lock-pin removed.
2 Cam slips easily into place on shaft with slots in alignment with keyways.
3 The sliding carrier with keys attached quickly locks cam in position on shaft.

THE *Nichols* TOOL ROOM MILLER

"the miller that uses its head!"

The unusual versatility and extra capacity of this model make it extremely useful for the tool room. Because it is equipped with the "rise-and-fall" spindle, it can perform not only conventional precision milling, but also facing boring, key seating, contour milling and other operations. Both longitudinal and transverse feed screws are fitted with hand wheels and extra-large adjustable micrometer dials with easy-to-read graduations. This model is especially useful because of its compactness, generous capacity and ability to handle a wide variety of work to close tolerances *—to "tenths" when desired!*

A valuable accessory is the Nichols Heavy-Duty Vertical Milling Attachment. Takes full 1½ H. P. up to 2000 R. P. M. (So precise, some shops use it for jig boring!)

CONDENSED SPECIFICATIONS

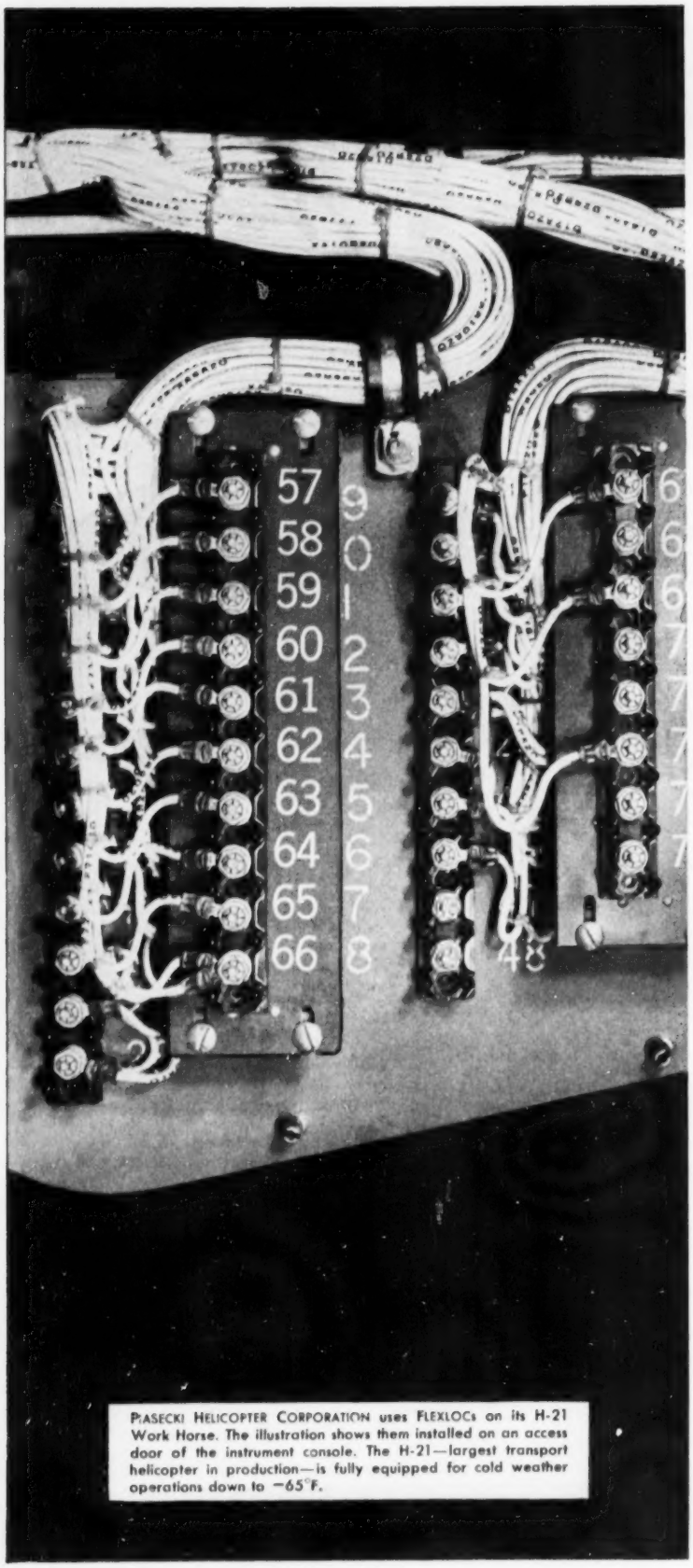
Table Working Surface	8½" x 30"
Longitudinal Travel	19"
Transverse Travel	7"
Vertical Travel—Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges up to 5000 R. P. M.	
Weight	1250 lbs.

Write today for Nichols general catalog which describes the six models of Nichols Millers. A sound, color movie, "the Miller that Uses its Head" is available for free showing. May we reserve it for you?

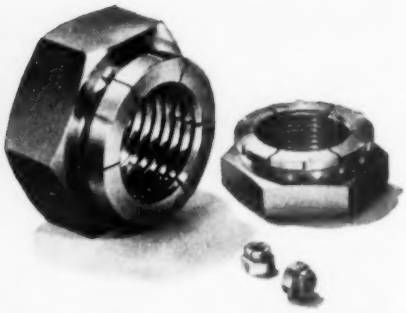
MANUFACTURED BY W. H. NICHOLS COMPANY • WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

76-F MAMARONECK AVE. WHITE PLAINS, N. Y.



PIASECKI HELICOPTER CORPORATION uses FLEXLOCs on its H-21 Work Horse. The illustration shows them installed on an access door of the instrument console. The H-21—largest transport helicopter in production—is fully equipped for cold weather operations down to −65°F.



Why use FLEXLOC locknuts?

The answer is simple. They hold assemblies together, and won't work loose like ordinary nuts. Once you install these one piece, all metal nuts, you can forget them. Yet they can be easily removed and can be reused again and again.

No fastening job is too tough for a FLEXLOC. Whether it's on an access door of a Piasecki Helicopter or the picker stick of a high speed loom, a FLEXLOC stays put.

FLEXLOCs save production and maintenance time. They are one piece, all metal—nothing to assemble, come apart, lose or forget. Standard FLEXLOCs have higher tensile than most other nuts—and because they are all metal, are not affected by temperatures to 550°F.

SPS can deliver any quantity of FLEXLOCs in a wide range of sizes. Stocks are carried by industrial distributors. Write for literature and samples. SPS, Jenkintown 1, Pa.

FLEXLOC®

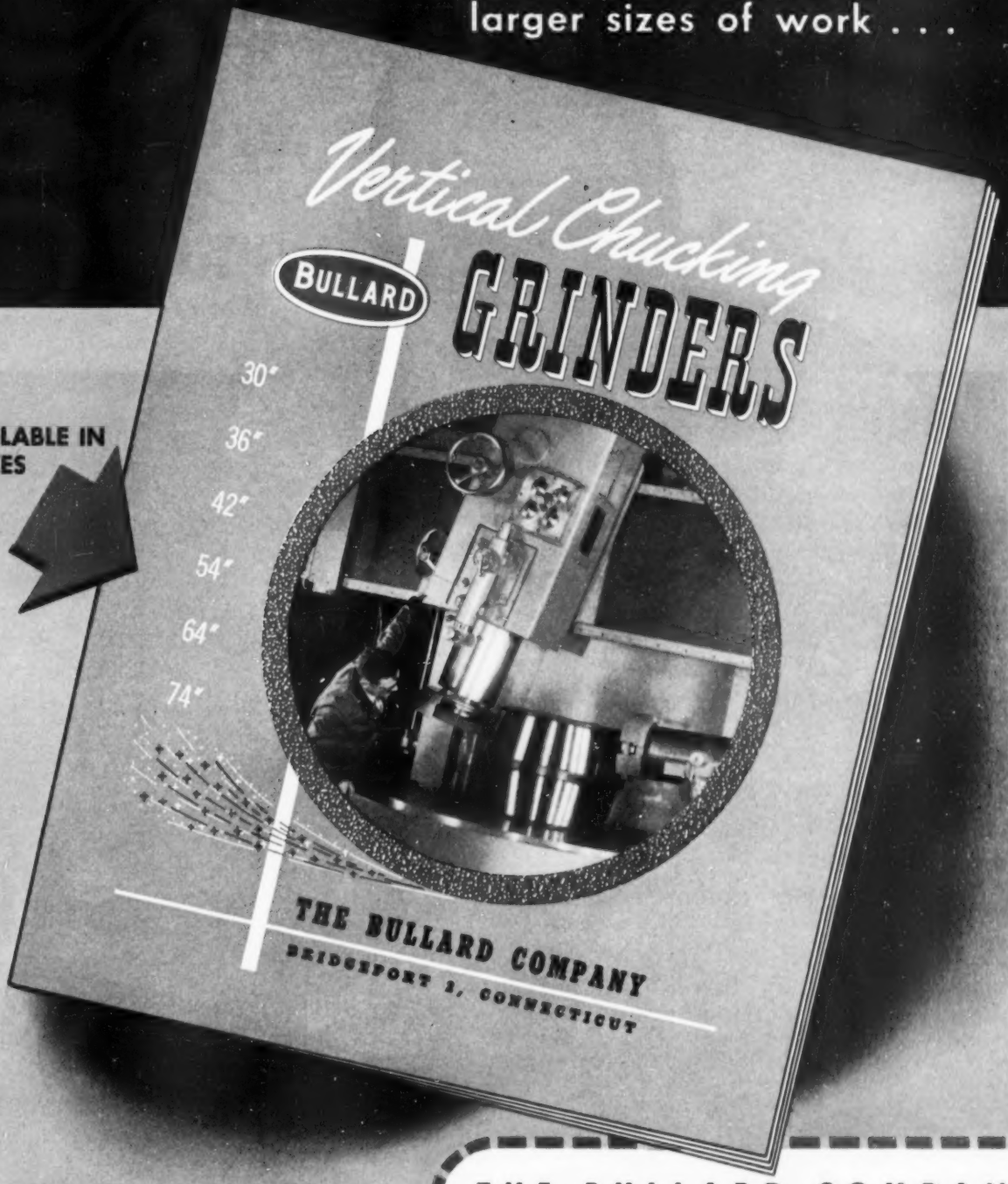
LOCKNUT DIVISION

SPS

JENKINTOWN PENNSYLVANIA

Our Fiftieth Year : A START FOR THE FUTURE

. . . for today's requirements on the larger sizes of work . . .



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BRIDGEPORT 2, CONNECTICUT

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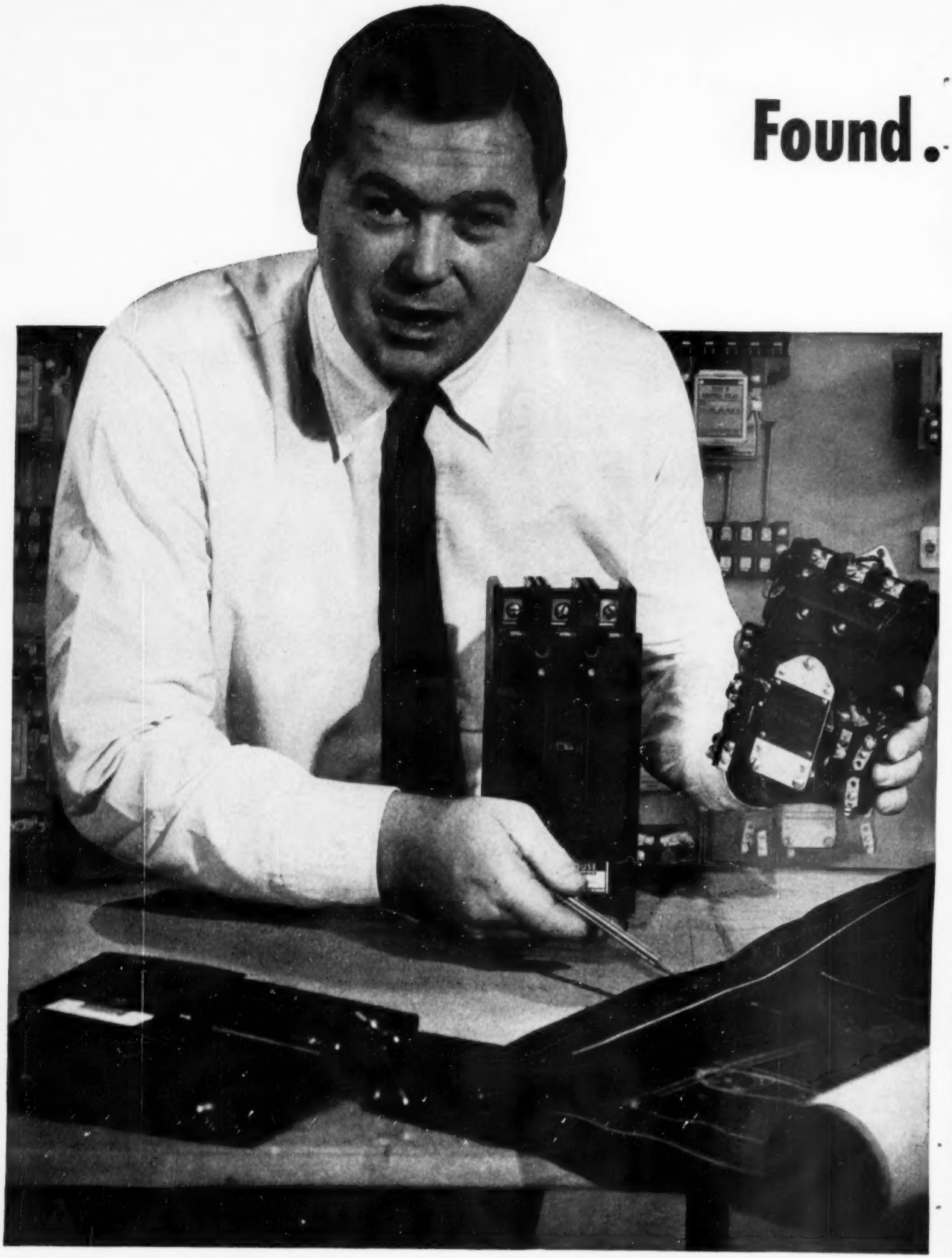


..a new way to better machine control panels

Match proved protection of Westinghouse AB Circuit Breakers with the dependability of Westinghouse Motor Control

Why? Because Westinghouse Motor Control will give you top performance in your *entire* control panel—performance that you've always had with Westinghouse AB Circuit Breakers. With Westinghouse Control, you get the same dependability and versatility. You can build panels that do more work, faster, with greater accuracy, with less attention, with complete protection. Panels that will make your machine easier to sell.

Both Westinghouse Circuit Breakers and Control provide the greatest variety of functions in the fewest possible units. The result? Flexibility in use and arrangement of panel components, savings in space, speed in mounting parts.

Here are two of the exclusive advantages in Westinghouse Linestarters® that will give you maximum dependability for millions of cycles.

1. Knife-edge bearing on which is mounted Life-Line's only moving part. No sliding members to cause binding friction, mechanical wear, electrical failure.

2. Bimetallic disc-type principle of overload protection—snap-action protection that cannot fatigue, never fails. The Westinghouse Bi-metal Relay retains precise calibration because it is not affected by aging, oxidation or repeated resetting. Attempt all the "hot" resets you want—it won't fail.

Get full value—in designing, in buying, in mounting, get the advantages of both Westinghouse Circuit Breakers and Motor Control. Your Westinghouse Representative will be glad to assist in application problems, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

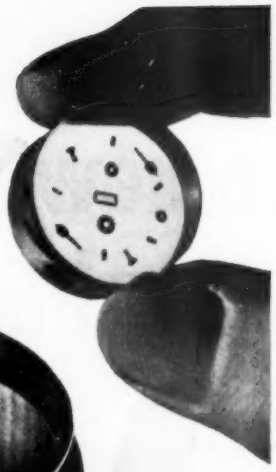
J-30163

YOU CAN BE **SURE**...IF IT'S

Westinghouse

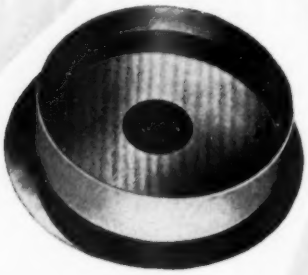
Tiny?

Yes! The No. 11 Blanchard Surface Grinder grinds these ladies' watch gears, pinions and ruby bearings flat and parallel, and to a dimension tolerance of .0002".



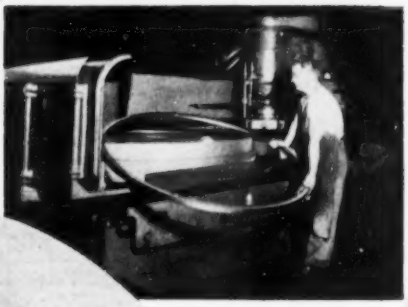
Smooth?

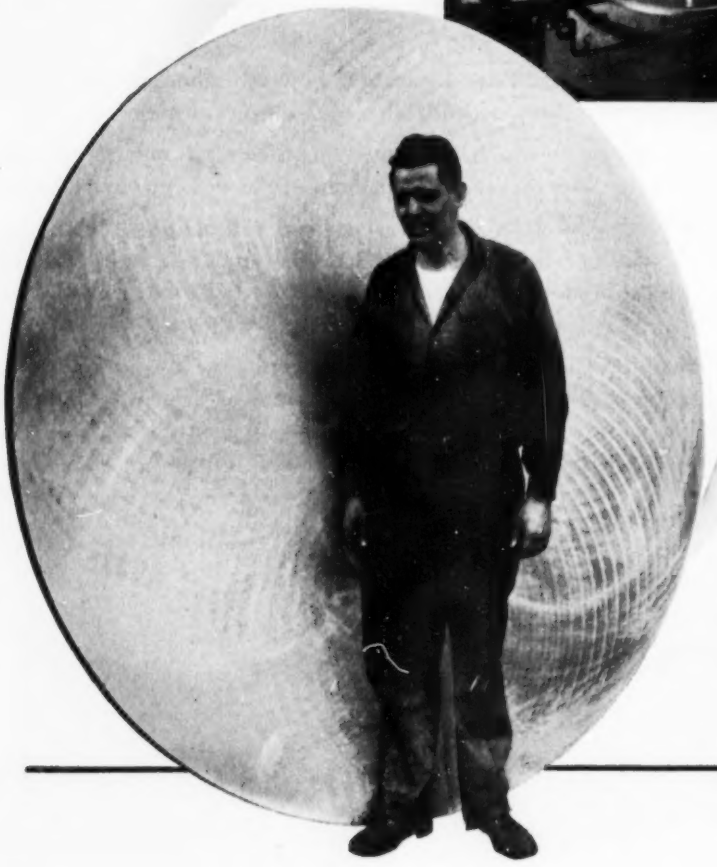
Of course! The Blanchard No. 11 finished this refrigerator plate, seen through an optical flat, to 3 micro inches and flat within 1 light band (.0000118").



Accurate?

Sure . . . and easy, too! This Blanchard grinds 84" forged steel rings flat within .0002", parallel to .0002", dimension tolerance of ±.0005", and with surface finish of 4 micro inches.





Tremendous?

Yes . . . but fast! This 88" diameter cast-iron plate was ground on a No. 42-72-84 Blanchard in 3½ hrs., floor to floor. ¼" of stock—1520 cu. in.—380 lbs. was removed.

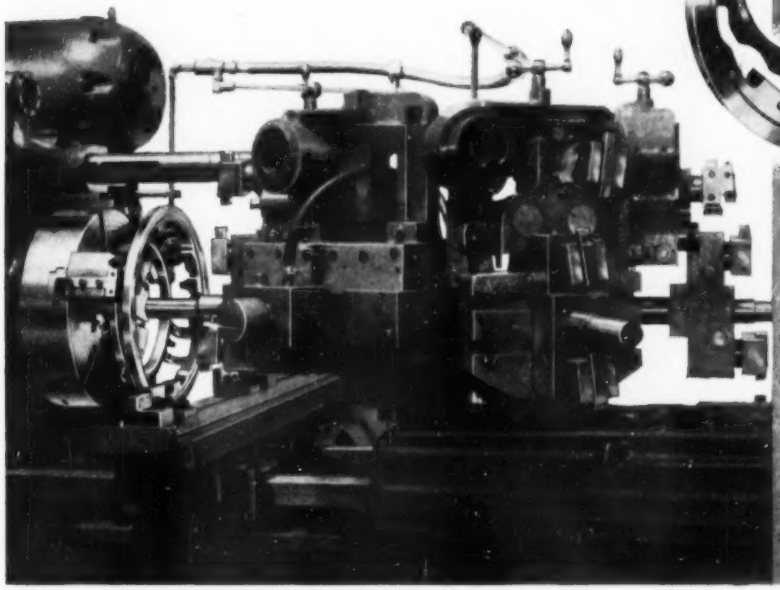
If you produce flat surfaces, your best bet is Blanchard Grinders—with Blanchard Wheels!

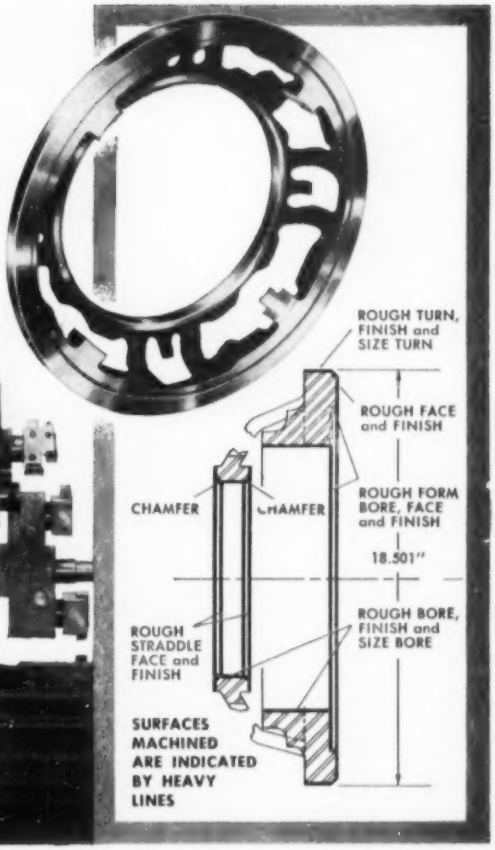
PUT IT ON THE BLANCHARD

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

THE BLANCHARD MACHINE CO.
64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

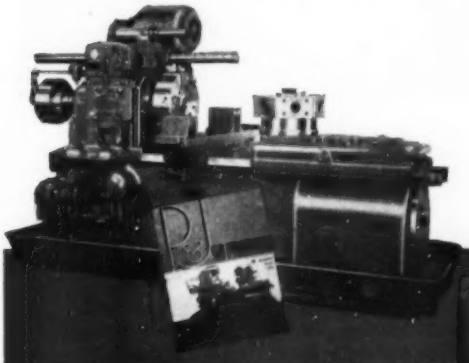
DO IT BETTER,
DO IT *AUTOMATICALLY*




ROUGH TURN, FINISH and SIZE TURN
ROUGH FACE and FINISH
CHAMFER
CHAMFER
ROUGH FORM BORE, FACE and FINISH
18.501"
ROUGH BORE, FINISH and SIZE BORE
ROUGH STRADDLE FACE and FINISH
SURFACES MACHINED ARE INDICATED BY HEAVY LINES

...do it on a 5-DELX POWER-FLEX Automatic Turret Lathe with P&J Tooling

For example, the steel casting shown above required *twenty* separate machining operations all of which were accurately performed in a single, fully-automatic cycle . . . thanks to P&J Tooling on a P&J 5-DELX Power-Flex. Set for most effective speeds and feeds for each cut, P&J Automatics faithfully repeat the same cycle for every work piece without the chance of operator error. Operator fatigue is greatly reduced; one man can easily tend several machines allowing maximum opportunities for divided labor costs.



You can take guesswork out of your production picture . . . be sure of better work, lower costs and fewer rejects . . . when you do it automatically. Let today's outstanding production team — P&J Automatics plus P&J Tooling go to work for you. Send today for your copy of the 5-DELX Power-Flex Bulletin No. 131 — or ask P&J Tool Engineers to submit time and money-saving recommendations based on your own prints or sample parts.

POTTER & JOHNSTON CO.
PAWTUCKET, PHODE ISLAND
SUBSIDIARY OF
PRATT & WHITNEY
DIVISION NILES – BEMENT – POND COMPANY

P&J

Turchan and MODERN combine to speed production of "Wasp" aircraft engine parts

AIRCRAFT armament and civilian plants report 4 to 6 times more production on parts of high accuracy with Turchan tracer control equipment.

This method reproduces work shapes by means of hydraulically tracer-controlled tools taking uninterrupted cuts over the work piece. The Turchan Single 45° compound lathe attachment operating at 45° angle to the center line of spindle replaces the conventional cross slide.

Shown above is one of several Turchan-equipped "Modern" Tracermatic Lathes in operation at Pratt & Whitney Company's new Canadian plant where the famous "Wasp" aircraft engines are made. This plant is equipped with the very latest automatic machine tools.

Whether turning a delicate valve stem, or a large mill roll, Turchan tracer-controls automatically duplicate the work faster, more accurately, without special form tools or highly skilled help.

Automatize now—with Turchan!

Produce better work, faster, at lower cost. There is Turchan automatic tracer-control equipment for any make or size of standard and special machine tool.

GET AN ESTIMATE: Send a sketch and specifications of any job. Give make and model of machine. We'll show you how to produce it better, faster, at lower cost.

Turchan **FOLLOWER MACHINE CO.**

8259 LIVERNOIS AVE., DETROIT 4, MICH.

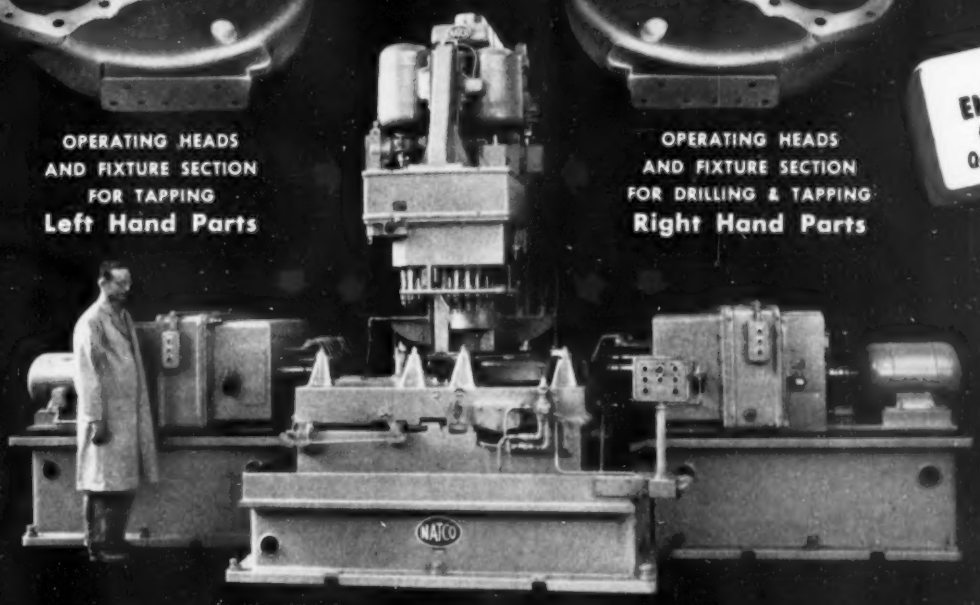
NATCO HOLETAPPER and DRILLER

DRILLS AND TAPS EITHER RIGHT HAND OR LEFT HAND TANK CASES

OPERATING HEADS AND FIXTURE SECTION FOR TAPPING **Left Hand Parts**

OPERATING HEADS AND FIXTURE SECTION FOR DRILLING & TAPPING **Right Hand Parts**

NATCO ENGINEERED for Quality and Quantity Production



OPERATION DETAILS

LEFT HAND PART

POSITION 1
Remove and Load

POSITION 3
Vertical Head
Tap 4 Holes
L. H. Horizontal Head
Tap 4 Holes

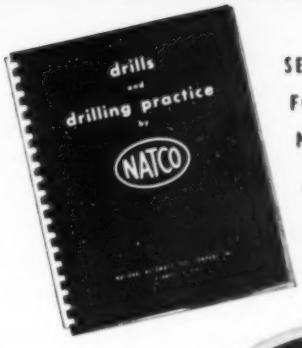
POSITION 2
Vertical Head
Idle
L. H. Horizontal Head
Tap 3 Holes

RIGHT HAND PART

POSITION 1
Remove and Load

POSITION 3
Vertical Head
Drill 8 Holes
R. H. Horizontal Head
Tap 4 Holes

POSITION 2
Vertical Head
Tap 8 Holes
R. H. Horizontal Head
Tap 3 Holes



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Address: NATCO, Richmond, Indiana

Call a Natco Field Engineer

to help you solve your problems in Drilling, Boring, Facing and Tapping

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

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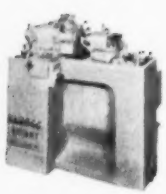
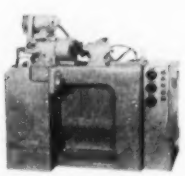
bryant
internal grinding



no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".

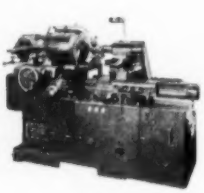


no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".

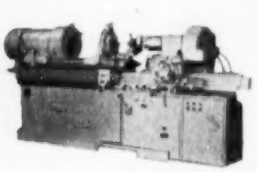
no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



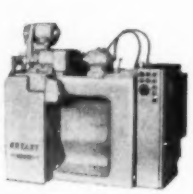
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



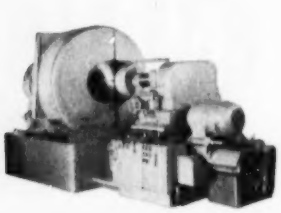
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1209

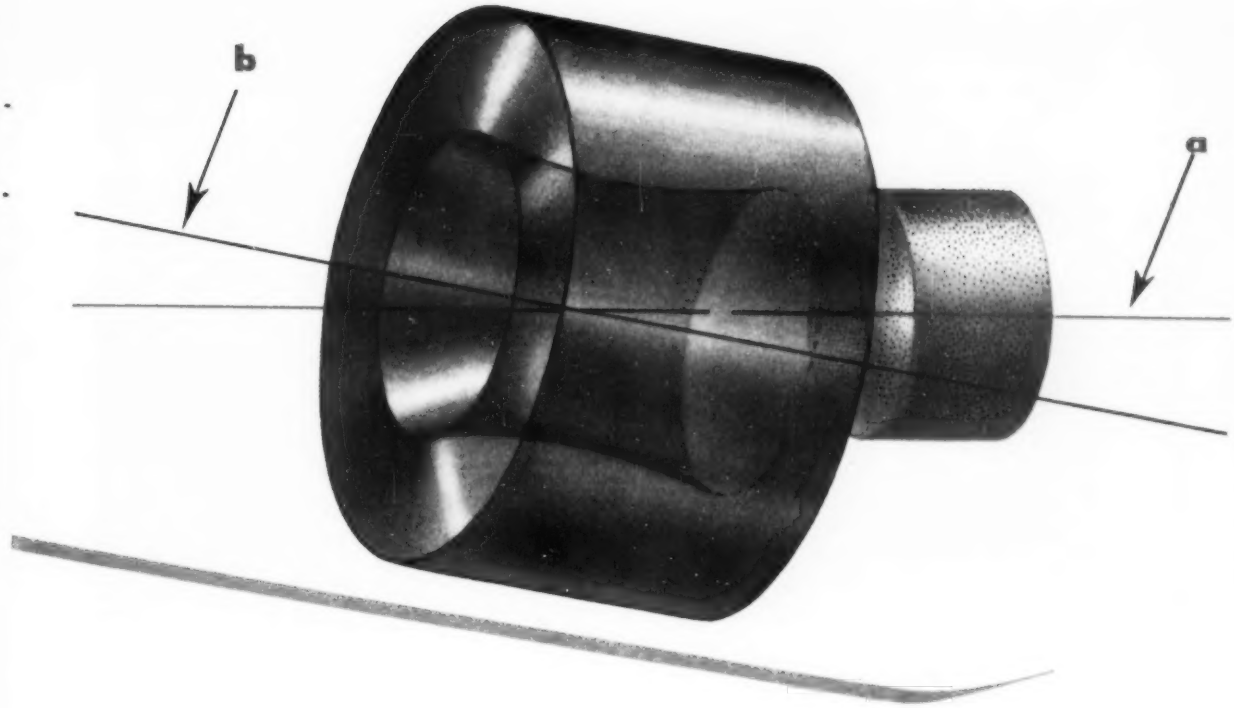
A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".



no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".

"Alignment for Better Internal Grinding", a new, sound color moving picture is available for free showing to engineering groups. Write for descriptive booking form.



BELL mouth holes are a common internal grinding error. General available information advises simply turning the workhead or changing the length of traverse to correct this error, to generate a straight hole. In the case illustrated above, where bell mouth exists on both ends of the hole, either turning the workhead or changing the length of stroke will improve the shape of the hole but will not correct the error. In the illustration, the work axis "b" is tipped out of alignment with wheel and wheel path axis "a". When the wheel, moving on axis "a", traverses the front of the hole, it grinds above the work center line and the front of the hole will be oversize. As the wheel traverses the center of the hole, the hole will be smaller. As the wheel traverses the back of the hole, it grinds below the center line and the hole will again be oversize. While the wheel contact may be a full line, it will not be parallel to the axis of the work.

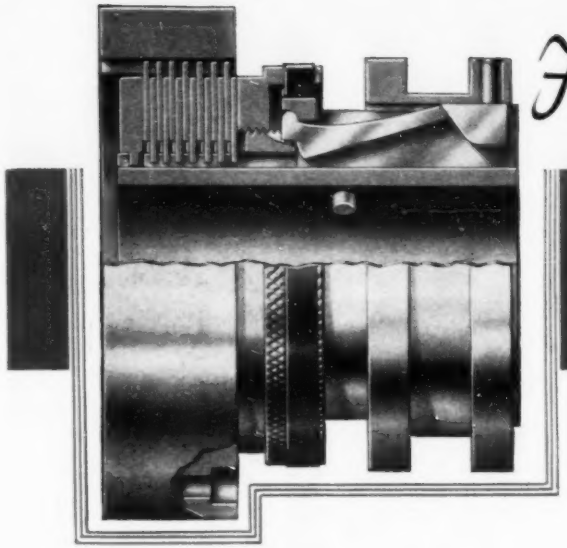
The only possible remedy is to correct the alignment of the workhead axis "b" so that it will be parallel with the wheel and wheel path axis "a". Wheel wear will be uniform but, most important, the geometry of the hole will be correct.

Bryant internal grinders are engineered to permit adjustment which will bring the workhead into proper alignment.

Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages



For **MACHINE TOOLS... MACHINERY... PRODUCT DESIGN...** *Specify*

MAXITORQ *floating disc* CLUTCH

There are 2 basic types of Maxitorq clutches . . . Single and Double. Above is a cut-away view of the single type . . . the double is shown at right. Each is available in 8 capacities (wet or dry) from ¼ to 15 h.p. @ 100 r.p.m. And from 13 to 788 max. working torque ft. lbs. Pulley type, Ring type, or Cut-off Coupling Driving Cups are also available.

The Maxitorq automatic overload release clutch (up to 5 h.p.) is extremely useful for protection of machine and product against accidental overload in high speed production. Special bulletin on request.

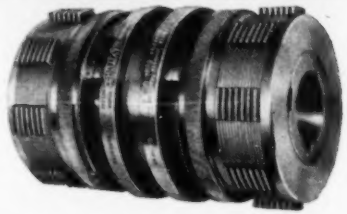
Send for Catalog No. AM-6

We hope you haven't minded turning this magazine around, but it was the only proper way to include the picture at the bottom. It clearly shows all parts of a single Maxitorq Clutch...and how easy it is to adjust it, take it apart, and assemble it...manually.

Each and every part contributes to smooth, positive, trouble-free clutch operation. The Separator Springs between each pair of inner discs keep them "floating" in neutral...preventing drag, abrasion, and heat. A Locking Plate locks all discs against the tension of the Separator Springs. The Adjusting Ring provides the means for obtaining the desired shifting pressure.

These are some of the reasons why we counted 69 machines, exhibited at the last Machine Tool Show, that were equipped with Maxitorq floating disc clutches. Send for our 50th Anniversary Catalog... and see how Maxitorq answers your problems for dependable power transmission.

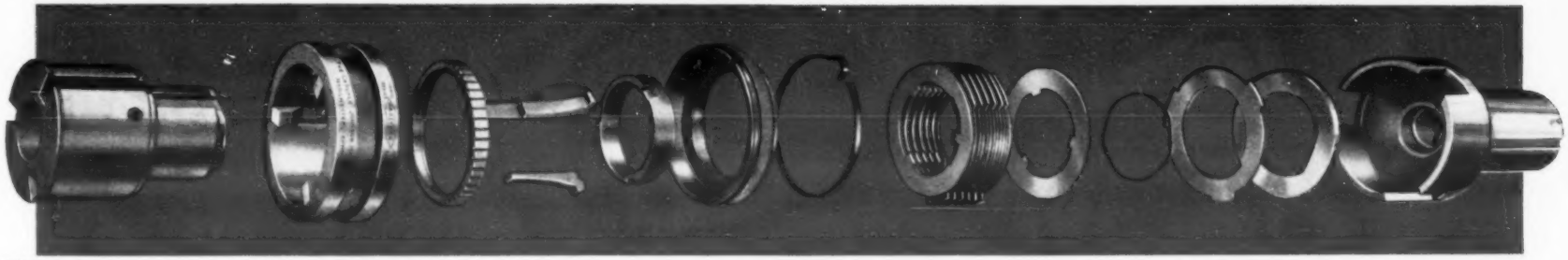
THE CARLYLE JOHNSON MACHINE CO.
MANCHESTER, CONNECTICUT



Compact, rugged construction and precise machining... flat, true surfaces on engaging faces of the discs... provide not only the exacting accuracy required in important industrial machines, but also long, profitable service life.

Our engineers will give you personal assistance for correct selection of the right clutch and installation for your specific requirement.

ALL ASSEMBLY, DISASSEMBLY AND ADJUSTMENTS ARE MANUAL. CLUTCHES SHIPPED ASSEMBLED ON THE BODY.



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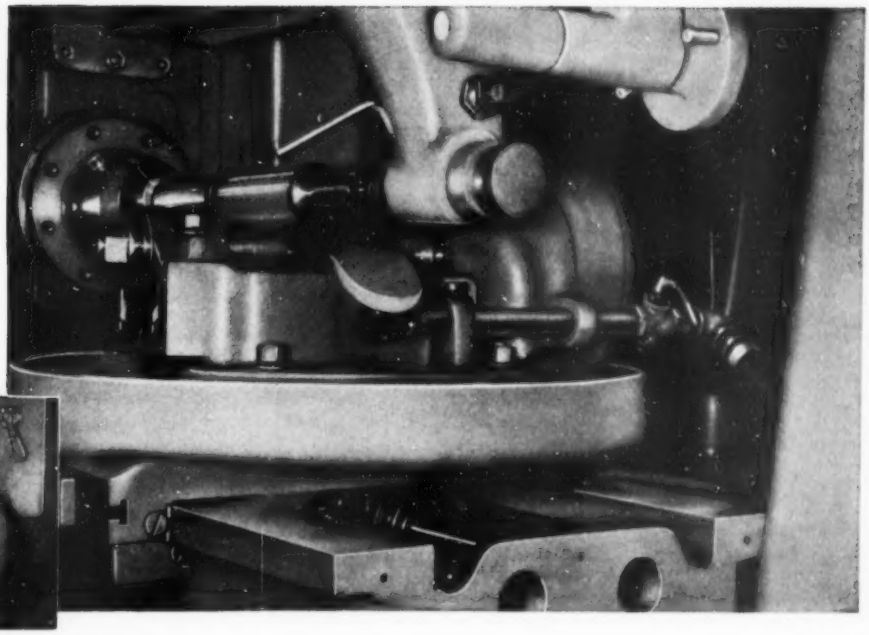
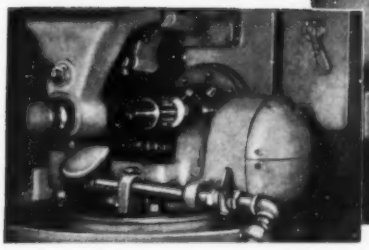
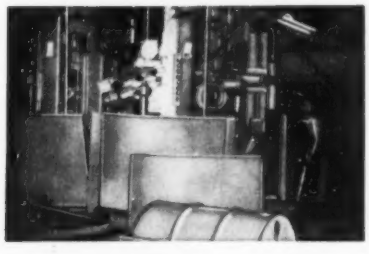
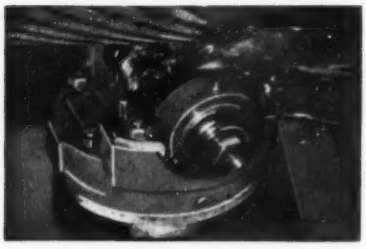








"ON-THE-JOB" CUTTING OIL TESTS BY CITIES SERVICE ENGINEERS!

at Timken-Detroit Axle Company

TOOL WEAR REDUCED 25%...MANUFACTURING COSTS ALSO CUT!

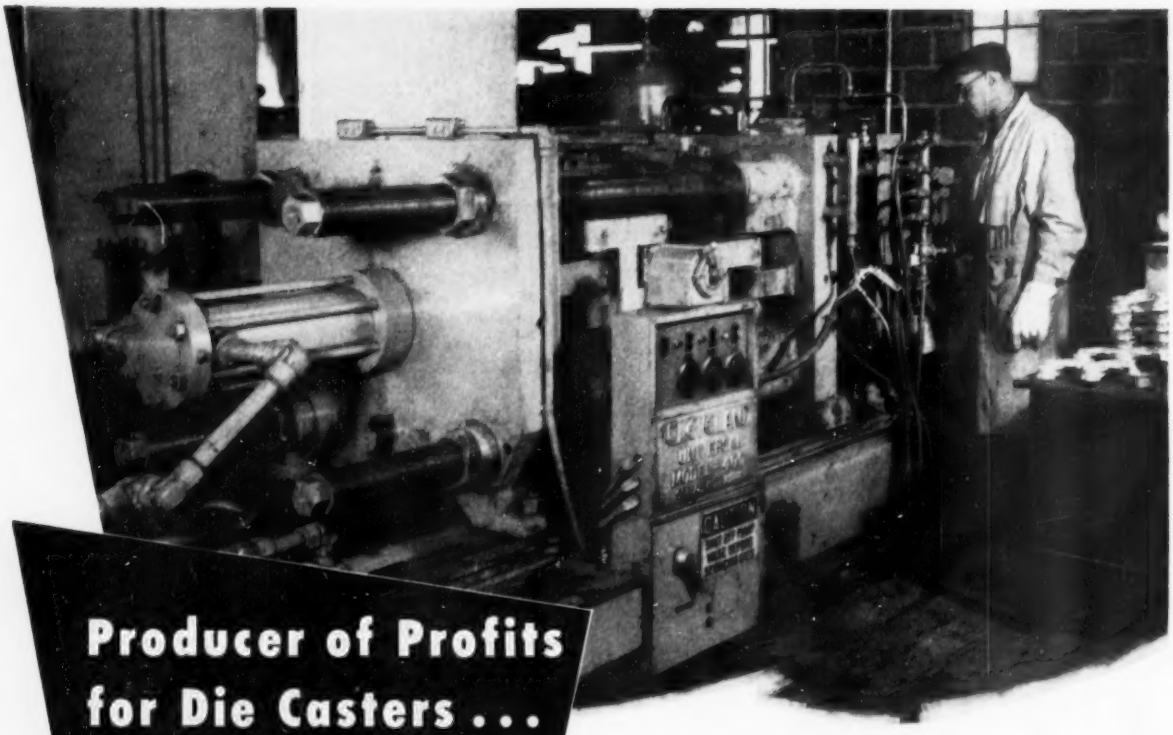
In an effort to reduce tool wear and cut manufacturing costs, the Wisconsin Division of Timken-Detroit Axle Company at Oshkosh called in Cities Service Engineers to make "on-the-job" tests.

Cities Service Lubrication Engineers made an on-the-spot study of the Timken-Detroit operation. This "on-the-job" evaluation by skilled Cities Service Engineers, long practiced in solving like problems, resulted in a recommendation for the use of a Chillo Cutting Oil that actually reduced tool wear 25% with proportionate savings in manufacturing costs!

WHAT ARE YOUR PROBLEMS? Why not take advantage of free, "on-the-job" testing? Call for our lubrication engineers at the office nearest you, or write Cities Service Oil Company, Dept. F4, Sixty Wall Tower, New York City 5, New York.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



Producer of Profits for Die Casters . . .

Aluminum Burner Bases as cast in Clevelands

Photo at top of page shows one of two Cleveland Model 400 Die Casting Machines in operation at General Die Casting Company, Ferndale, Michigan. Among the many excellent parts produced by this prominent die caster is an aluminum burner base used by most leading gas range manufacturers. The burner bases are cast in a four-cavity die at the rate of 100 shots per hour. Weight of the shot is 2½ lbs. A gate of four castings and a finished part are shown above.

CLEVELAND model 400 die casting machines

Ask experienced die casters about Cleveland performance. They'll tell you these rugged, powerful machines can be depended upon to produce dense, *hardware finish* castings at a highly *profitable* rate of production.

Die casters like the ease with which Clevelands can be set up; the accessibility for changing dies, removing castings and machine maintenance. They like the simplicity and *safety* of operation; the fool-proof, automatic timing of the casting cycle. They like Cleveland's *universal* construction. Simply changing hot metal ends converts the machine from zinc to aluminum or magnesium casting . . . and any machinery handling crew can make the change *quickly*, without using special tools. That gives die casters all-around utilization of their machinery investment—and more profits for their shop.

Investigate Model 400 Clevelands for *your* die casting production . . . or Cleveland Models 200, 100 and 50, if your requirements call for machines of smaller capacities. Let a Cleveland engineer show you their advantages. For detailed machine information, write for bulletins.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4928 Beech Street
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SALES OFFICES: CHICAGO
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Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

Ask your Distributor

Photograph by Paul Davis

The extra quality built into every Butterfield tap
pays off on your production line.

B U T T E R F I E L D

Union Twist Drill Company ***Butterfield Division*** *Derby Line, Vermont, U. S. A.*

TAPS • DIES • REAMERS • DRILLS • COUNTERBORES • SCREW PLATES

Photograph by Paul Davis

TAPS *by* CARD

Built into every Card tap are years of concentration on one ideal — to build the best taps money can buy.

Completely stocked offices at Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco and Seattle.

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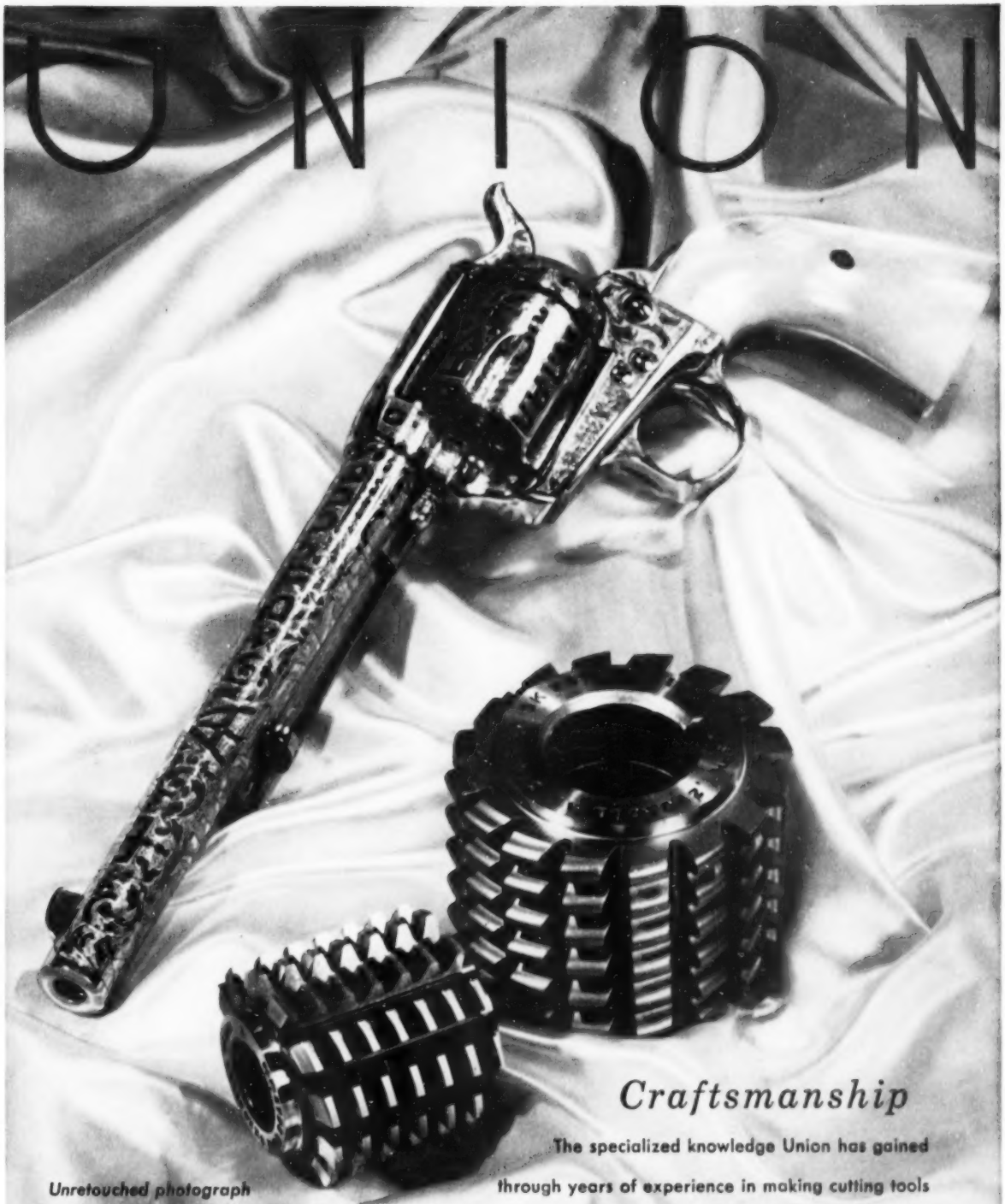
S. W. CARD MANUFACTURING CO., MANSFIELD, MASS. • DIVISION OF UNION TWIST DRILL CO. **TAPS • DIES • SCREW PLATES**

UNION



Unretouched photograph by Morton Berger

Craftsmanship

The specialized knowledge Union has gained through years of experience in making cutting tools is applied to every individual design it turns out.

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

OWNERS AND OPERATORS OF: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

This ad....

Help Wanted

COMPANY to design and build shell loading hydraulic presses. Must be fast, efficient and engineered for safety. World War II experience preferred.

DESIGNE... tool designers, draftsmen, ...established manufacture...

FITS KRW *to a.....*

If we saw the above ad in tonight's paper, we'd reach for the phone . . . quick! The job's made to order for K. R. Wilson. During World War II, KRW engineers designed a faster and safer method for loading shells and incendiary bombs. Hundreds of KRW 1-station, 2-station and 4-station shell loading presses were supplied to bomb loading contractors across the country. The photo at left above shows a close-up of the shell case holder on a KRW 4-station shell loader. At right is a battery of KRW presses working at top speed in one of the nation's largest arsenals.

K. R. Wilson is set to do an even bigger job today. Almost two million dollars in new machinery and equipment have been added to our plant since World War II. So if you have shell-loading contracts, write, wire or phone KRW for the right equipment. We can go to work on your order at a moment's notice.

Send for

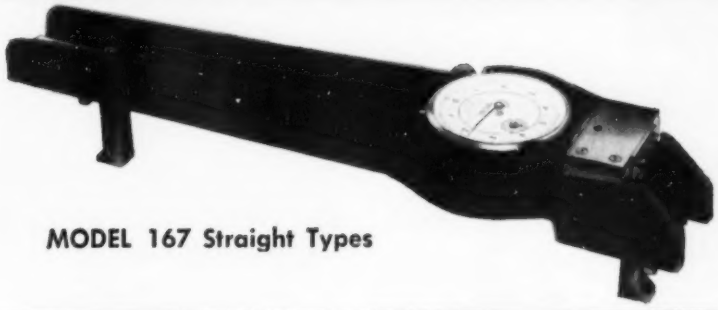
FREE NEW BOOKLET

It tells all about our plant, equipment, facilities and experience in war and peace-time production. It's yours for the asking. Write Dept. II.

K·R·WILSON

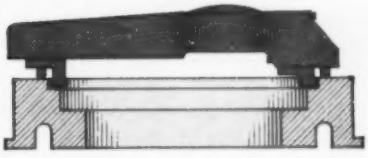
215 Main St. • Buffalo 3, N. Y.

Here's the Answer for Inspecting SHALLOW DIAMETERS



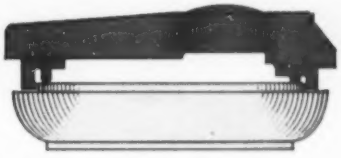
MODEL 167 Straight Types

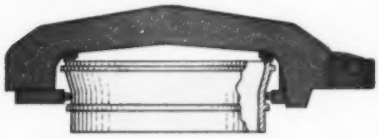
either **INSIDE**



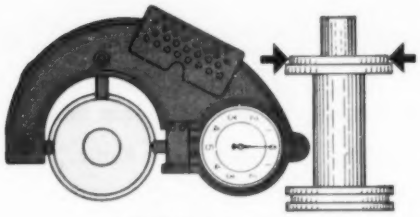
MODEL 236 Straight Types

or **OUTSIDE**





Humped Types
Inside or Outside



"C" Types
Inside or Outside

Checking the accuracy of a diameter on a shallow shoulder or similar section is often a problem, especially if the diameter is large in comparison with the surface being measured. (See sketches.) With these Shallow Diameter Gages, however, it's easy to get fast, accurate checks.

"Locating" contact points help to position the gage parallel to the flat surfaces of the workpiece so the actual diameter is read perpendicular to the axis of the workpiece. Both inside and outside diameters, and diameters at various depths, are checked positively and accurately.

For checking workpieces having projections which would interfere with Straight Type Gages, the Humped Types are recommended. For measuring similar dimensions remotely located from either end of the workpiece, "C" Type Gages are the answer. Let us know your requirements. Federal Products Corporation, Providence 1, Rhode Island.

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Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES

FEDERAL PRODUCTS CORPORATION • 1126 Eddy St., Providence, R. I.
Please send me information about the following:

☐ **Model 167 Straight Types** ☐ **Model 236 Straight Types** ☐ **Humped Types** ☐ **"C" Types**

Sketch ☐ Blueprint ☐ is enclosed showing dimension we wish to gage.

Name _____

Company _____

Street _____

City _____ *State* _____

This is another of the "HUNDREDS OF JOBS" which can be done on a MARVEL Band Saw!

MARVEL BAND SAW saved these two 4400 lb. castings

Two sand cores washed out when these giant 4400 pound steel connecting rods were cast, resulting in solid eye ends without gaps. Then came the $64 question—how to machine out the 1½" slots in the longitudinal center of the eyes which were 22" high and had a wall thickness of 6½".

The Ernest J. Nelson Iron Works of San Francisco, did this "impossible" job easily, quickly and economically, without special tooling, on a standard Model #8M/2 MARVEL Band Saw. Two cuts were made in each rod in two hours per cut with tool cost of $3.06 per rod. The tool was a MARVEL 89-10 Band Saw Blade.

Every tool room, machine shop and maintenance department needs a MARVEL Series 8 Universal Band Saw—not only for innumerable everyday jobs but for the occasional "trick" operations, where its utmost versatility will save many headaches and dollars.

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MARVEL Metal Cutting SAWS
Better Machines—Better Blades

These exclusive Marvel Features made this job easy.

1. Large, T-slotted work table.
2. Blade feeds into work vertically; work always stationary.
3. Power-pressure feed.
4. Automatic Blade tension.
5. Built-in coolant system.
6. Large capacity.

ARMSTRONG-BLUM MFG. CO.

5700 BLOOMINGDALE AVENUE **CHICAGO 39, ILLINOIS**

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CLEEREMAN JIG BORERS

Precision—

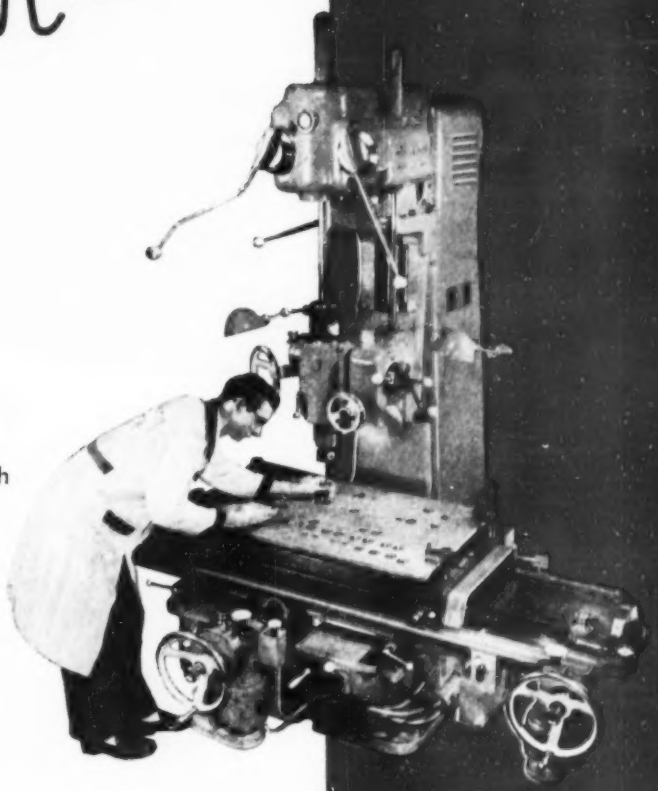
by

CLEEREMAN

. . . for ultra-fine tolerances on highest quality gage, tool, die, jig and fixture work—and on "jigless" production

. . . to stand the gaff in today's high pressure tool room and production plant service

. . . for higher profits and higher output through the ultimate in operating ease and efficiency



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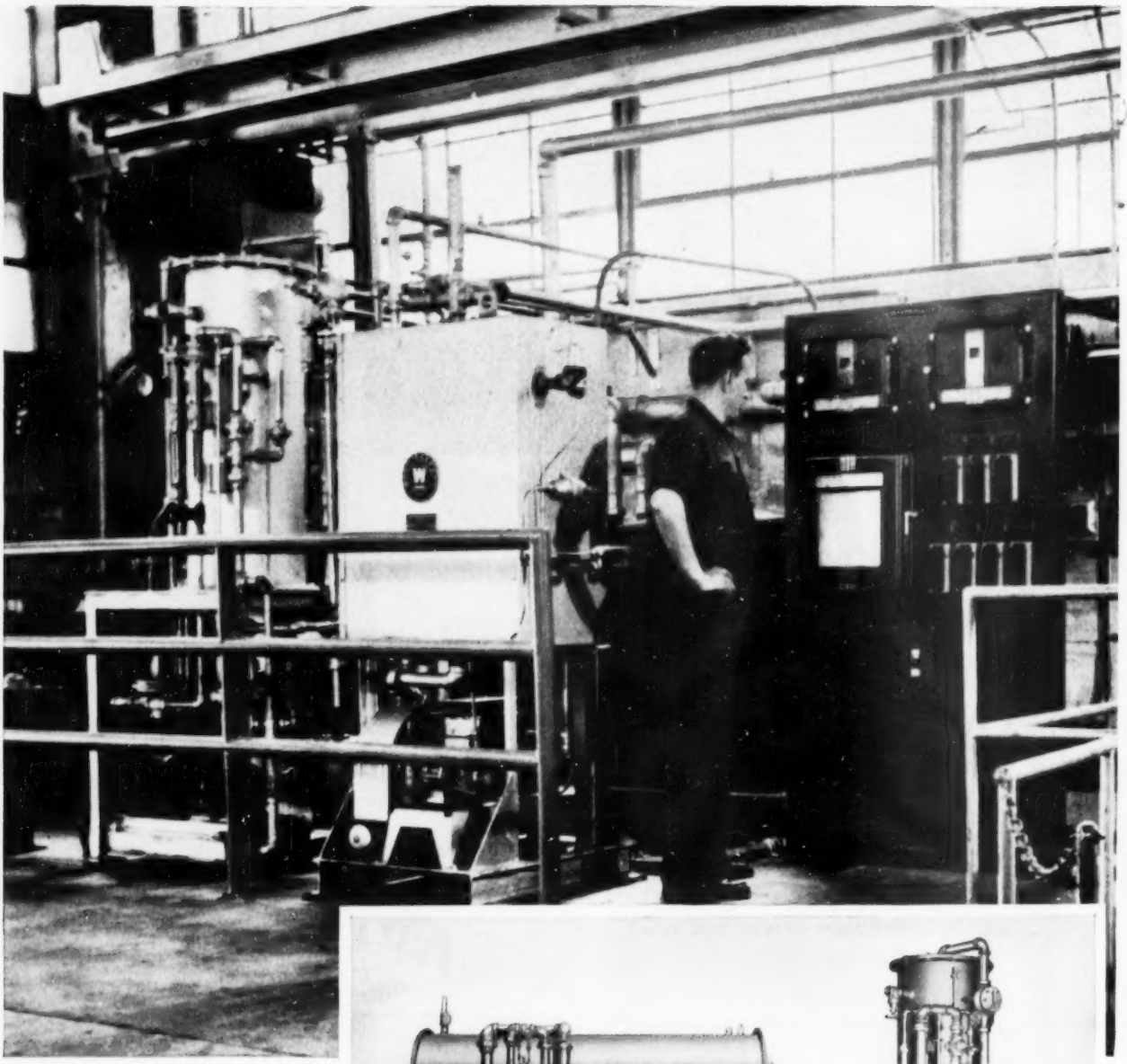
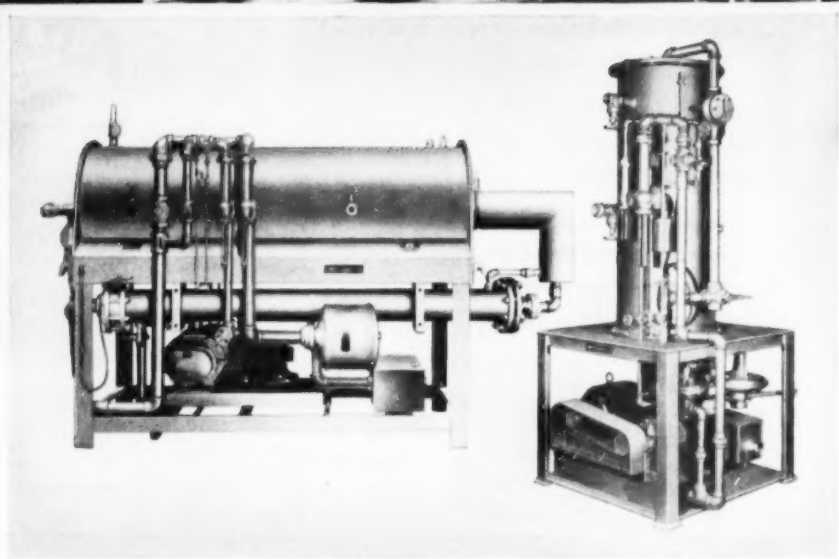
CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

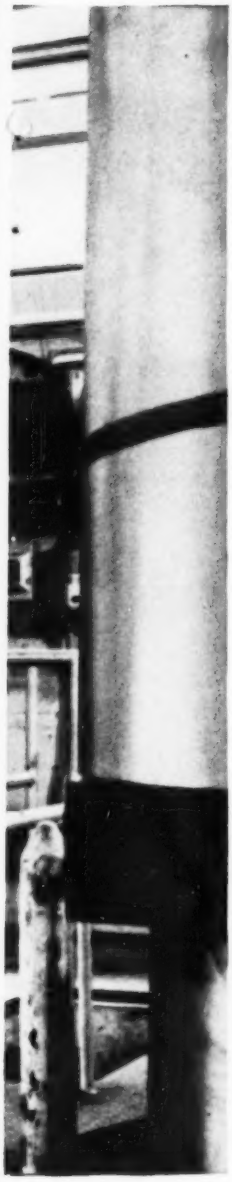


This is a Westinghouse Exogas Atmosphere Generator with refrigerant drier plus pyrometers and mounting panel for a furnace installation.



The 500-cfh Exogas Generator is a good example of a space saver. The combustion chamber in this model is mounted vertically.

Exogas Generators are available in a range of sizes up to 30,000 cfh. Pictured above is one rated at 8,000 cfh. All models are shipped completely assembled.



How to get atmosphere flexibility at 4.6¢ per 1,000 cu. ft.

Westinghouse gives you the opportunity to perform a variety of heat-treating jobs at low cost by using one generator and atmosphere . . . Exogas®.

Westinghouse Exogas is ideal for toolroom, production-line or laboratory heat-treating such as austempering, annealing, brazing, drawing, forging, normalizing, solution treatment, where bright work is desired but where decarburization is not a problem. Westinghouse Exogas can be produced from any fuel gas such as coke-oven, natural, propane, or butane, which means heat-treating flexibility without basic fuel problems. The size is right, too . . . fits easily into compact floor space.

Investigate Westinghouse Exogas Generators and Atmosphere by phoning your nearest Westinghouse office, or writing to Westinghouse Electric Corporation, Industrial Heating Department, Meadville, Pa.

J-10394

YOU CAN BE SURE...IF IT'S

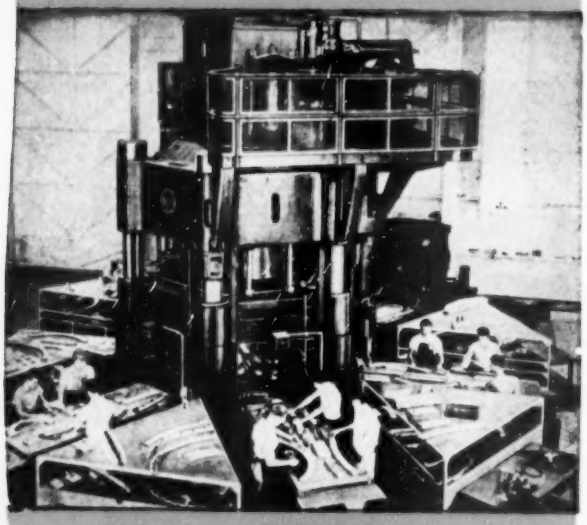
Westinghouse

IF YOUR PRODUCT CALLS FOR HEAT-TREATING...IT CALLS FOR A WESTINGHOUSE FURNACE...GAS OR ELECTRIC

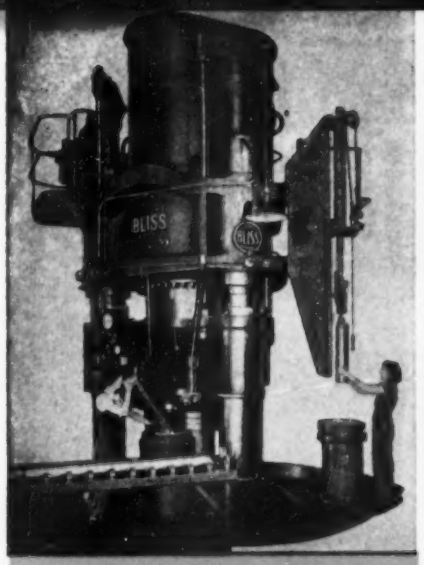
For Sheet, Plate or Powder... a BLISS **Hydraulic** Press for Every Operation

DRAWING

REDRAWING

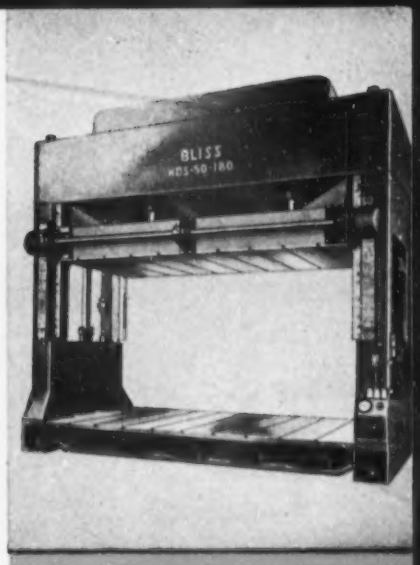


RUBBER PAD FORMING

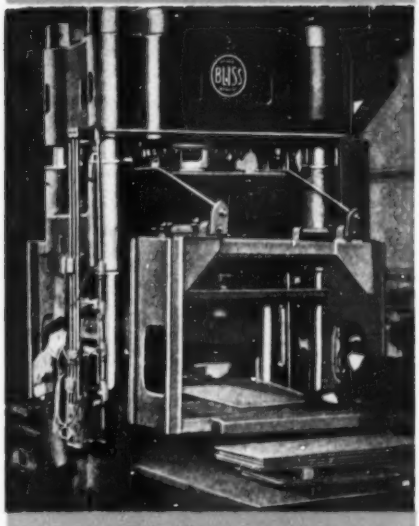


HEADING

COINING



DIE SPOTTING



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Certain fundamental advantages of hydraulic presses make them ideal for many defense and civilian production jobs. That's why Bliss has developed one of the most complete hydraulic press lines available. Whether you're working with sheet, plate or powder . . . whether your needs involve single, double or triple actions, housing or open-rod frames, moving-up or moving-down types, Bliss has a hydraulic press for every operation.

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Presses, Rolling Mills, Special Machinery

For the right press
for a given job...
Hydraulic **or Mechanical...**

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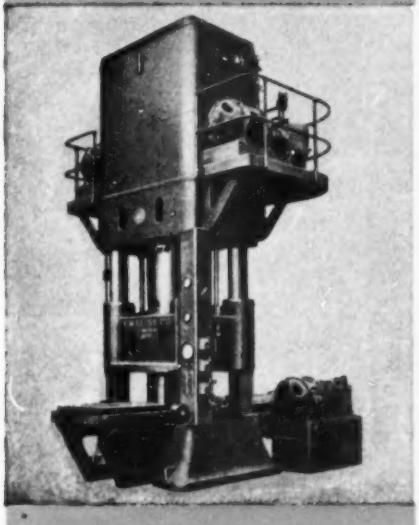

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POWDER METAL FORMING

700-Page Handbook Tells How to Use Presses Efficiently

Bliss Power Press Handbook, 450 illustrations. Sections on: Easy methods of computing press jobs • How to select proper press • Engineering tables • Die illustrations • Glossary of terms • Plus service section on all Bliss presses.

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ACCURACY is

Micrometer accuracy starts with Cincinnati Hydraulic Holddowns. They exert tons of pressure and automatically hold all thicknesses of work securely.

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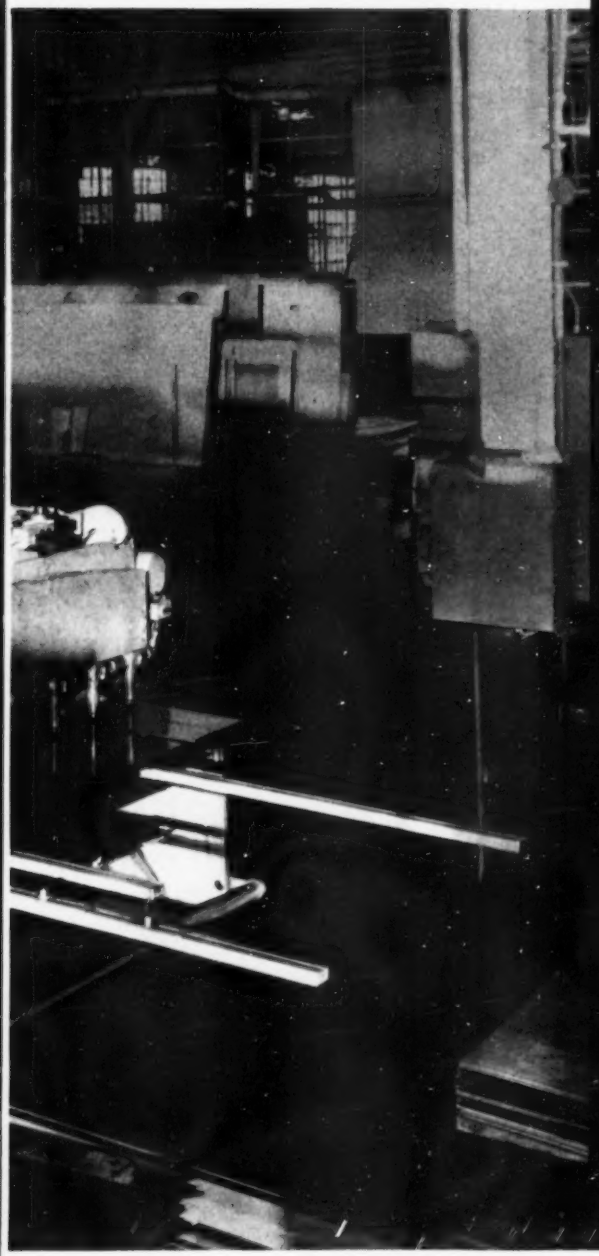

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CINCINNATI SHEARS

IS NEEDED, TOO...

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They handle cold finished, or pickled and oiled sheets up to 10 gauge and hot rolled sheets up to ¼". Both management and operators are enthusiastic about their Cincinnati Shears.

Write for Shear Catalog S-6.

Photos courtesy The W. J. Holliday Company, Inc., Indianapolis, Indiana

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CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

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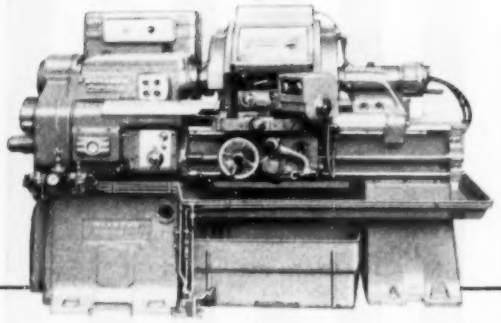
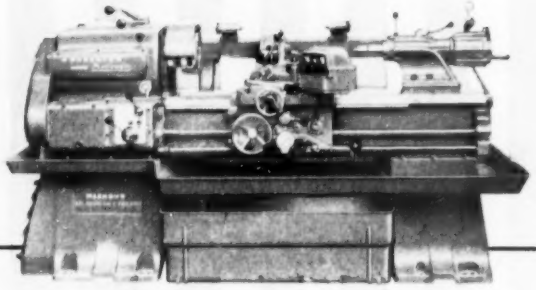
DUPLICATING AND TURRET LATHES

Simple In Operation • Sturdy in Construction
Versatile In Performance

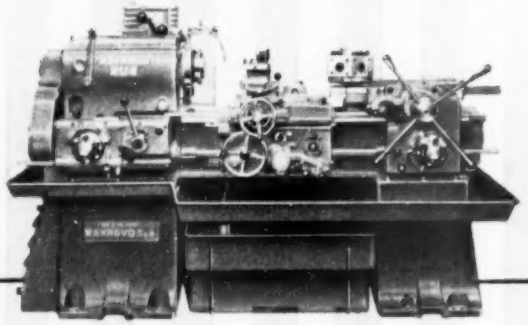
MAXNOVO MODEL A AUTOMATIC CYCLE "PROFILOMATIC" DUPLICATING LATHE—17" swing over ways, 4½" over cross slide, with 20", 30", or 40" center distance. Machine equipped with air chuck and tailstock to provide a completely automatic cycle with automatic speed and feed changes. Automatic speed and feed changes are accomplished by an automatic cycle control bar which operates precision microswitches. Copies from master template mounted at rear of machine out of the way of chips and coolant. 12½ or 15 H.P. drive.



MAXNOVO MODEL U UNIVERSAL "PROFILOMATIC" DUPLICATING LATHE—Swing over ways 17". Maximum turning dia. over cross slide 4". Distance between centers 30", 40", or 50". 6 or 12 spindle speeds from 75-1400 R.P.M. Duplicates automatically from a sample work piece or from a flat template. The sensitive electro-hydraulic tracing unit duplicates within extremely close tolerances. The duplicating slide can be locked out to permit use as a conventional lathe. 8 or 12 H.P. motor drive.



MAXNOVO MODEL RU 4 UNIVERSAL TURRET LATHE — Swing over bed 16-9/16". Swing over cross slide 9-7/8". Capacity through spindle 2". Maximum distance spindle nose to face of turret 29½". Spindle speeds 64-1200 R.P.M. 8 power feeds to carriage .002"-.024" per rev. and 32 power feeds to turret .0005"-.048". 8 or 12 H.P. motor drive. Machine can be furnished with air chuck, collet chuck, or bar feed attachment. The hexagon turret faces are machined to American standards.



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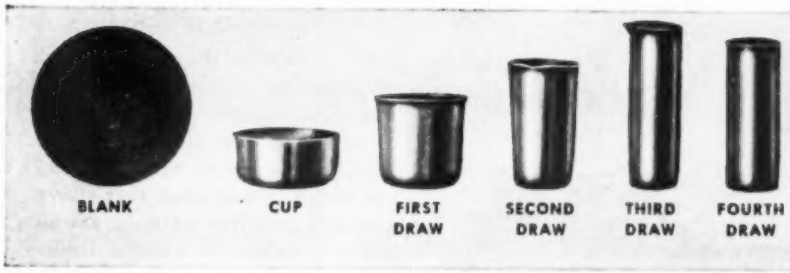
CABLE ADDRESS MACHBUILD, NEW YORK



Currently, draw dies of Carboloy cemented carbide are speeding up production on everything from shoe eyelets to .30 cal. brass cartridge cases and 155 mm. brass and steel shell casings. Send coupon for details on carbide draw dies.

Carbide dies outdraw steel dies 10 to 20 times on shell cases

Field engineering – At your call, a Carboloy die expert will drop around to your plant and help solve your carbide die problems. Call him whenever you want on-the-spot answers on design and application of carbides in dies.

Die training school – Courses in design, application and maintenance of carbide dies are given free at Carboloy Die School. Plan to enroll your men now. Send coupon for information.

Dies equipped with Carboloy cemented carbide really stand up in production of steel shell cases. Even under terrific hour-after-hour continuous drawing, they wear 10 to 20 times longer than steel dies and deliver an extremely high finish.

Other drawing applications – similar benefits.

Such benefits are not unusual from Carboloy drawing dies. On some applications, they'll outwear other dies by 50 to one. The same holds true for blanking, forming and piercing dies made of Carboloy cemented carbide.

Naturally, when dies wear like this, you get greater production with less downtime and maintenance . . . fewer rejects and less finishing . . . cash savings all down the line.

Whether you make or use press dies, simple or complex, for any die operation, explore the possibility of applying Carboloy cemented carbide to those dies. You can order Carboloy cemented carbide in finished or in rough form from Carboloy Department. On blanking dies, order rough carbide direct from Carboloy Department to be finished in your own or tool maker's die room. Expert Carboloy die specialists will assist you in carbide die design and application.

To get a better idea of the wide range of carbide dies and free Carboloy die services, send coupon.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

Check and Mail Today

"Carboloy" is the registered trademark of the Carboloy Department of General Electric Company

Carboloy Dpartment of General Electric Company
11149 E. 8 Mile Ave., Detroit 32, Michigan

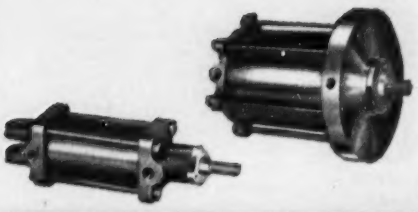
- ☐ Rush me free Carboloy Die Engineering Manual D-124.
- ☐ Send complete details on Carboloy Die School.
- ☐ Have a Carboloy field representative call at my plant.

Name _____ Position _____

Company _____

Address _____

City _____ Zone ____ State _____



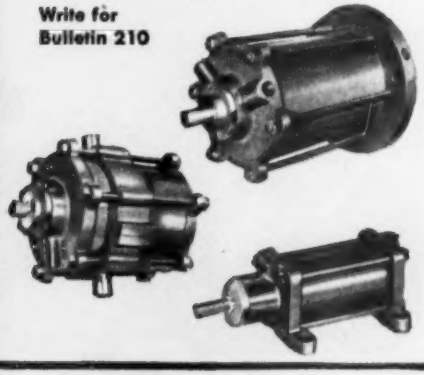
Pneumatic Cylinders

Really complete, the Hannifin line of pneumatic cylinders is made with two types of pistons . . . bores from 1" to 16" . . . six standard mountings. Really standard, these cylinders are tooled to tolerances that assure accurate mounting to make assembly to your machines easier. Really built, each cylinder is "TRU-BORED" and honed, piston rods are ground and polished, interchangeable end caps, heavy duty tie rods . . . rugged, yet precision construction throughout!

Write for Bulletin 210

NOW...

HANNIFIN HAS THE MOST COMPLETE LINE OF AIR CONTROL EQUIPMENT!



NEW! REVOLUTIONARY HANNIFIN *P-M Pilot-Master Valves*

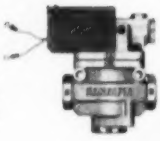
Piston-operated poppet design. Exclusive replaceable cartridge for easier maintenance. Speeds to 600 cycles per minute. Pressure from 15 to 150 p.s.i. Integral, solenoid-controlled pilot heads or a choice of 10 separate pilot valves for remote control.

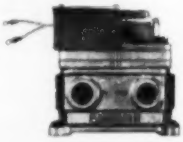
- Fewer Valves to Stock
- Fewer Parts to Stock
- Maximum Interchangeability
- No Springs in Main Valve

Write for Bulletin 231.

2 and 3-Way Valves.

Same valve operates 2-way or 3-way, normally open or normally closed. ⅜" to 1¼" I.P.S.

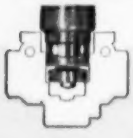




4-Way Valves.

Two 3-way valves mounted in compact, common body. Two piston poppets. Two cartridges. ⅜", ½", ¾" I.P.S.

EXCLUSIVE REPLACEABLE CARTRIDGE



AIR WARDEN

Air filters, pressure regulators and lubricators to protect air operated equipment. Bulletin 10108.

Disc Type Air Control Valves

Designed for smooth, positive and accurate control of air-operated equipment. Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation. Sizes: ⅛" to 1¼" I.P.S.

Write for Bulletin 57-W

Hannifin "Directair" electrically controlled air-operated disc valve

Foot-operated treadle valve (Also spring return and rotary types)

Standard hand control valve (Single or duplex)

HANNIFIN

Hannifin Corporation, 1117 S. Kilbourn Ave., Chicago 24, Ill.

Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves

We've put a new roof over an old part of our business

Now—with new, expanded facilities—we can offer you immediate help with your unusual metalworking problems, big or small

THOUGH we've been designing and building standard and special machine tools and tooling since 1898, limited production facilities for special machines have prevented us from offering these services on a wide scale.

But now, our Special Machinery Division has new and greatly expanded facilities. Its exclusive job will be to build special machine tools and tooling or to specially adapt standard equipment to solve specific metalworking problems.

Check our qualifications:

EXPERIENCE: We've been in the business 55 years. In addition to being one of the country's leading producers of standard milling machines . . . *our annual production of special machinery has ranged up to $3,000,000.*

FACILITIES: The new Special Machinery Division plant, built on a 38-acre site, is equipped with more than *$2,500,000 worth of new tools and equipment.*

PERSONNEL: The Special Machinery Division engineering section has nearly 100 experienced design and production engineers at its command. These men specialize in applying the latest developments in mechanics, hydraulics, electronics, metallurgy and allied fields to metalworking. In addition, it has a full complement of experienced machinists and mechanics needed for special machine construction.

PERFORMANCE: Kearney & Trecker's Special Machinery Division is best recommended by its record of successfully solving hundreds of unusual machining problems. These solutions required provision of high productive capacity as well as exacting dimensional accuracies and surface finishes.

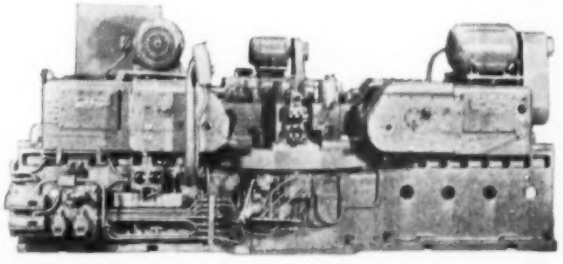
RESPONSIBILITY: Our Special Machinery Division is an integral part of the Kearney & Trecker Corporation . . . and is fully supported by all its financial, physical and personnel resources.

Any commitment for a product of this Division is a commitment that fully involves the accepted reputation for responsibility and satisfaction that is Kearney & Trecker's.

We invite your inquiry

We'll be glad to provide you with any information we can . . . including sample machine specification sheets on typical installations, a brochure covering the expanded facilities of our Special Machinery Division, and details on our Customer Engineering Service. Furthermore, if you have special production machinery problems, have one of our senior Project Engineers analyze them, without obligation, of course.

Write, wire or phone the Special Machinery Division, Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

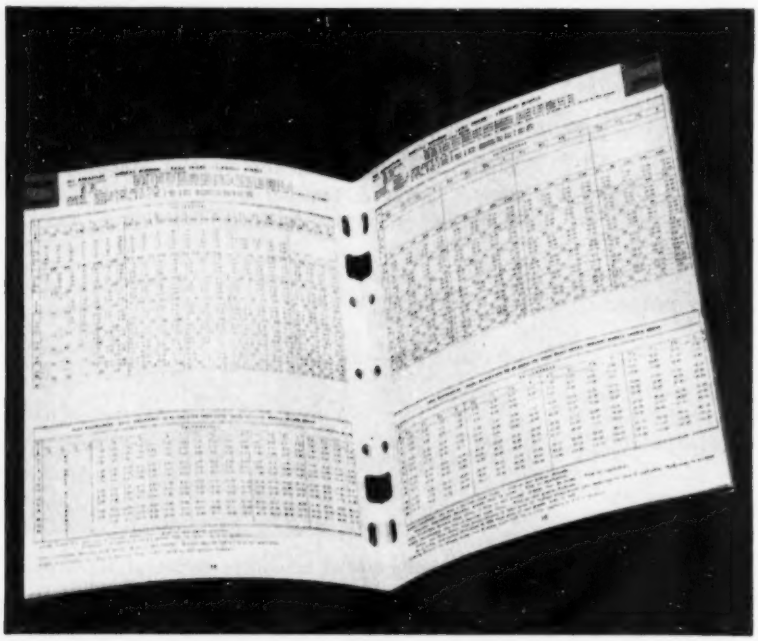


We've built special machines or adaptations of standard equipment for practically every industry. Here is a photo of a four-station rotary indexing machine we designed and built for a major automotive manufacturer.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

FIRST SIMPLIFIED PRICING IN GRINDING WHEEL HISTORY

CARBORUNDUM's New "Quick-Finding" Reference Replaces Traditional Complex Time-Wasting System



114 Page Pricing System Now Simplified to 32 Pages

CARBORUNDUM has achieved *simplification* with this new basic pricing system: previous information requiring 114 pages covering list prices, discounts, etc., has been reduced to only 32 pages.

You can now order your grinding wheels from CARBORUNDUM with a speed and accuracy hitherto impossible. Practically everything you want to know about prices, ordering quantities, discounts on any one wheel will be found on one page—arranged for quick, easy finding.

CARBORUNDUM® has taken the mystery out of buying industrial grinding wheels...by adopting the first really simplified basic price system in the history of the industry. Now you can determine prices, ordering quantities and discounts for a given wheel, almost without exception, by checking a single page of this new book.

You no longer have to refer to several pages to determine prices and discounts, nor follow complicated rules, nor apply chain discounts, nor worry about decimal multipliers. Even the special price additions covering various shapes have been eliminated. Basic prices are shown for all straight wheels *and* special wheels such as dishes, saucers, flaring cups, special faces, cones, plugs, and many others.

Practically all the wheels you use can be priced with a single discount under this new system, thus further simplifying your paper work and minimizing errors.

Coincidental with the adoption of this basic pricing system, some price adjustments have been made. Prices of certain lines of wheels are reduced, others are slightly higher.

(Advertisement)

"A Boon to Every Customer and To Us," is Distributor Concensus

First copies of this new pricing system off the press went to several hundred Industrial Distributors of CARBORUNDUM's grinding wheel lines. The many letters of response have been highly enthusiastic. Here are typical comments:

"This is, without a doubt, the finest simplified pricing system I have ever seen. We want to compliment you on this progressive step."

"Heartiest congratulations—the new net pricing schedules are swell! It would do your heart good to see the gratitude with which these prices were received by the boys in our organization. I feel that you men who devoted so much time to getting out this pricing structure should know how we feel. This is a real contribution to Industrial Distributors—and to industrial purchasing agents."

"Next to standardization of gradings, your new price book is probably the most progressive step that has been taken in simplifying the marketing of abrasives. With this new basic pricing plan practically all the complications have been removed. We know it will have enthusiastic reception."

"Carborundum has taken a forward step that should pay off in the future. After trying a few examples in pricing, it looks as though price clerks and purchasing people will have a much easier time arriving at net prices than heretofore."

The success of this new simplified pricing plan was foreordained, because twelve of the nation's top industrial supply men helped put the system together. This group, known as CARBORUNDUM'S *Distributor Advisory Board, was of material assistance to* CARBORUNDUM'S *sales management on this key project.*

HOW IT SAVES TIME...Cuts Errors

Reducing the number of pricing pages from 114 to 32 gives you only part of the picture of how CARBORUNDUM's new system speeds and simplifies the pricing of grinding wheels. It actually cuts down the number of steps required to compute a price—and best of all, it concentrates those steps within the confines of a single page.

As an example, consider the steps—and separate page references—previously required to find the price of cup wheels: 1) Look up the page showing the list price... 2) Look up the page showing list price additions... 3) Look up the page showing the standard ordering quantity schedule, to determine quantity for discounting purposes ...4) Look up the page showing product discount... 5) Look up the page showing quantity discount.

All this information, previously appearing in five different places in the price schedule, is now found on a single ready-reference page. No wonder pricing now takes far less time, with far fewer chances for error.

For when you have to flip pages back and forth, sometimes losing your place, often doing involved calculations, not only do you waste valuable time, but errors are bound to creep in—errors that are even more costly than the high cost of lost time. This new simplified "all-on-one-page" system was designed to be error-proof; thorough tests by grinding wheel users prove that it actually promotes a high degree of accuracy—thus makes doubly valuable the savings in time it gives you.

Simplified Pricing to be Extended to Other Abrasive Lines

The new basic pricing system will soon be applied to additional abrasive lines by CARBORUNDUM. Segments, Disc Wheels, Mounted Wheels and Points, "MX" Wheels, and other bonded products will shortly be covered by new simplified basic price lists.

THE CARBORUNDUM COMPANY

REGISTERED TRADE MARK

Your copy is waiting for you...

MAIL COUPON NOW...TODAY!

THE CARBORUNDUM COMPANY, Dept. AM 81-317
Niagara Falls, New York

Please send me my copy of "New Simplified Basic Prices of Grinding Wheels."

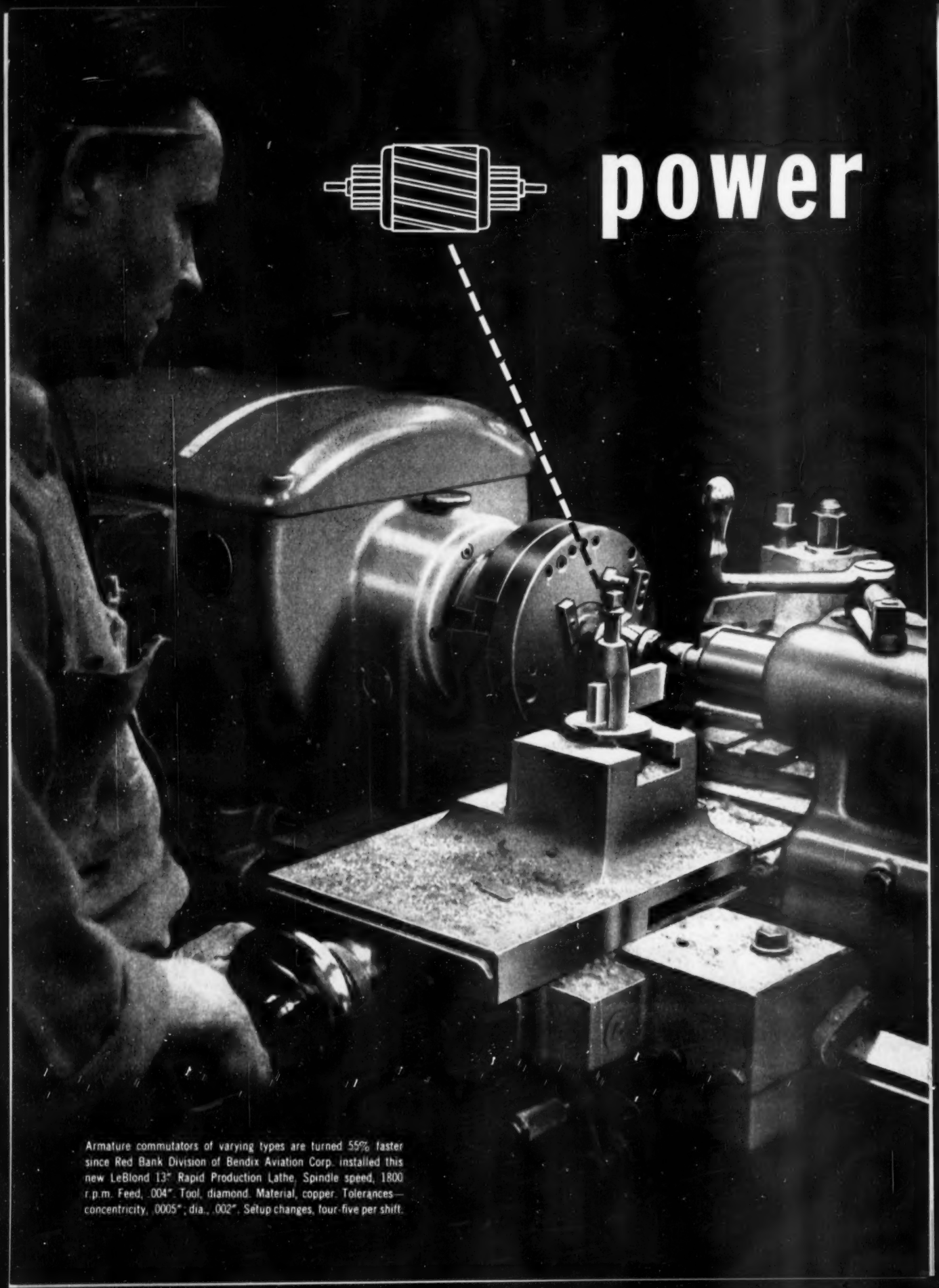
NAME

COMPANY

STREET AND NUMBER

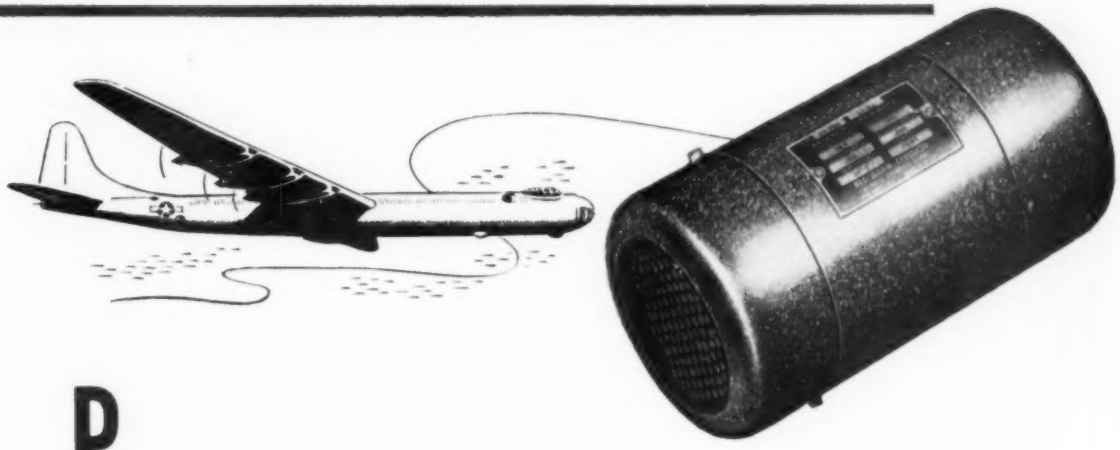
CITY ZONE STATE

81-317



Armature commutators of varying types are turned 55% faster since Red Bank Division of Bendix Aviation Corp. installed this new LeBlond 13" Rapid Production Lathe. Spindle speed, 1800 r.p.m. Feed, .004". Tool, diamond. Material, copper. Tolerances—concentricity, .0005"; dia., .002". Setup changes, four-five per shift.

for an airplane's eyes and ears



Power for vital radar and communications equipment in airplanes is supplied by dynamotors like this. They're made in dozens of types and sizes to provide precise, unfailing power for the variety of electronic accessories used in modern aircraft.

Heart of the dynamotor is the armature. Its commutators require turning to high degrees of finish and accuracy for dependability under all flight conditions. For this job Red Bank Division of Bendix Aviation Corp. needed a precision production lathe, versatile enough to handle the entire range of sizes without costly setups. They installed a new LeBlond 13" Rapid Production Lathe . . . recommended by the LeBlond New York Office. Result? *Production increased 55%.*

This LeBlond Lathe makes possible high-production turning of a *variety* of work within the range *you* choose. It offers your choice of two geared and one motor headstock with various speed combinations from 68 to 3600 r.p.m., feeds from .001" to .064". A score of attachments is available.

Whether you turn tiny armatures or ten-ton shafts, there's a LeBlond Lathe to turn them faster, better. Your nearby LeBlond Distributor will tell you about the 13" Rapid Production and other late models. Call him or write . . .

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

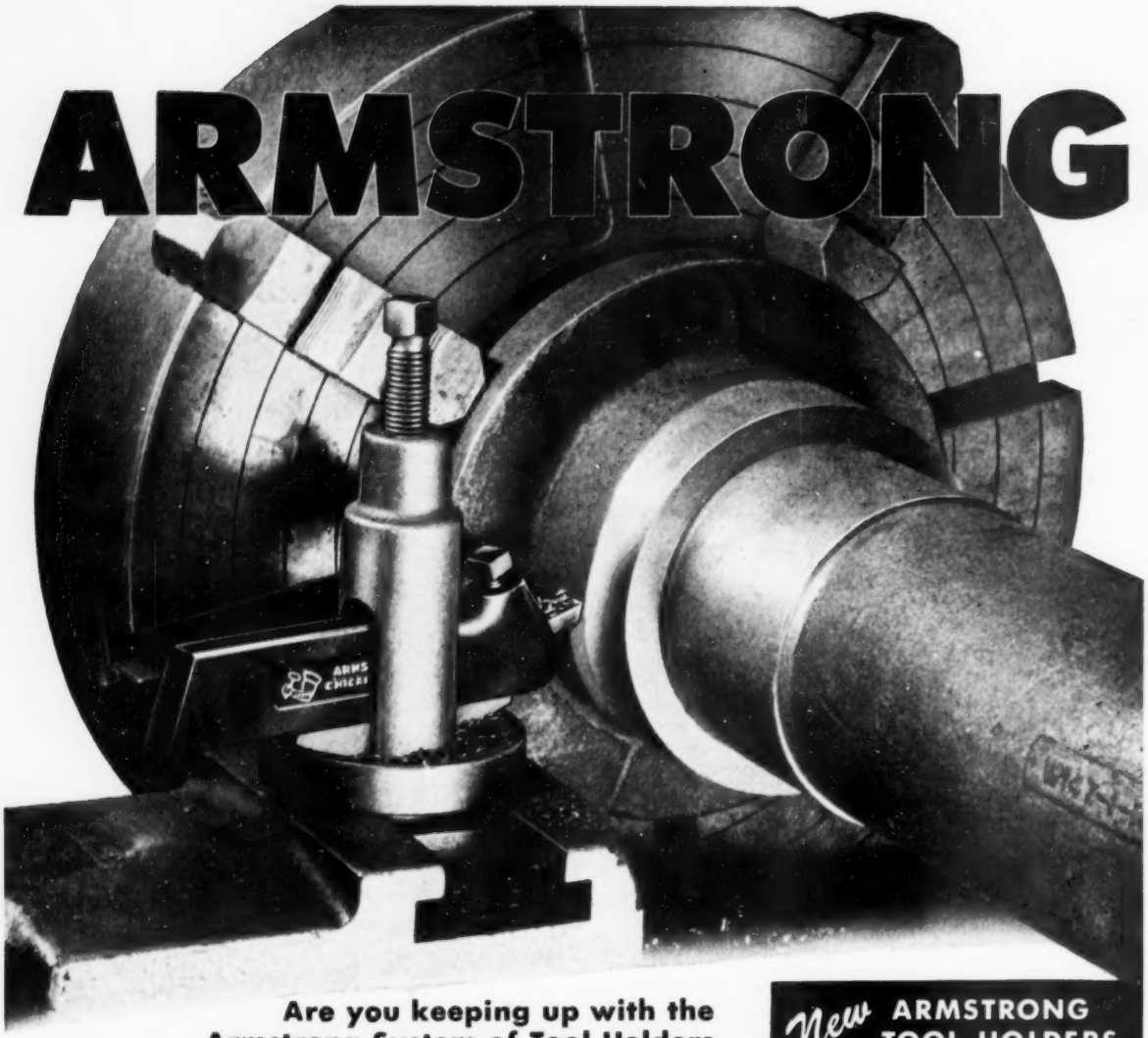
Ask for Bulletin RP-201 A for more information on the 13" Rapid Production Lathe.

turned faster by

LEBLOND
of Cincinnati

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 63 YEARS*

ARMSTRONG



Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.

WRITE FOR CATALOG

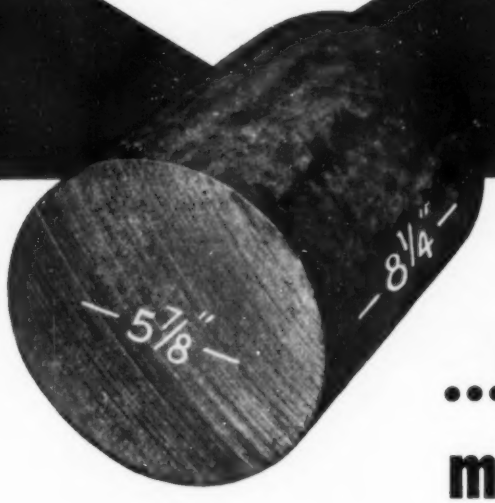
New ARMSTRONG TOOL HOLDERS
ARMSTRONG Spring Form Threading Tool Holder
ARMSTRONG Spring Cutting-off Tools
ARMSTRONG Carbide Tool Holders for Carbide-Tipped Cutters
ARMSTRONG "C-A" Tool Holders for ARMALOY (Cast-Alloy) Cutter-Bits

ARMSTRONG BROS. TOOL CO. *"The Tool Holder People"* 5215 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

THIS **63-lb.** 4150 STEEL BLANK

reduced to

THIS **18-lb.** SEMI-FINISHED COLLET



...in 13 minutes

ON THE NEW

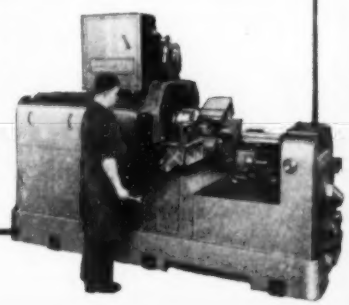
12" MC-UNIVERSAL

ACME-GRIDLEY

Single Spindle Automatic Chucker

FEATURES

- **Six spindle speeds and three feed ranges, *all automatically selective* for each combination of change gears. Spindle speeds range from 25 to 1478 RPM.**
- **Five end working tool slides and two side slides each independently cammed. Turret indexing located in rugged outer turret support and driven by separate motor independent of cross slide operation.**
- **Open type tooling zone, large chip area, minimum change of cams. Interchangeable spindle speed and feed change gears—all contribute to quick change-over from job to job.**
- **Work cycle automatically controlled—no time loss between loading and unloading work piece.**
- **Strength to sustain close tolerance at the fastest feeds and highest speeds modern carbide cutting tools and hardened steel cams can take.**
- **Compact, accessible and free from complications — one man runs 2 or more machines.**



The floor to floor time on this particular job is *5 times faster* than the previous method employed.

The job is typical. If savings like this—in man hours—in floor space, overhead—*total costs per job*—are important in your chucking work, why not ask us to help you make similar comparisons—get the facts.

Complete catalog, MC-53

You can't do TODAY'S job with YESTERDAY'S tools—and be in business TOMORROW.

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

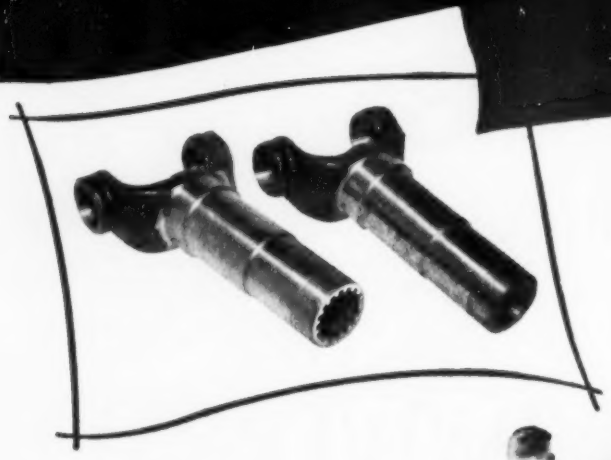
Acme-Gridley Bar and Chucking Automatics, 1-4-6 and 8 Spindle —Hydraulic Thread Rolling Machines—Automatic Threading Dies and Taps—Limit, Motor Starter and Control Station Switches—Solenoids—Contract Manufacturing

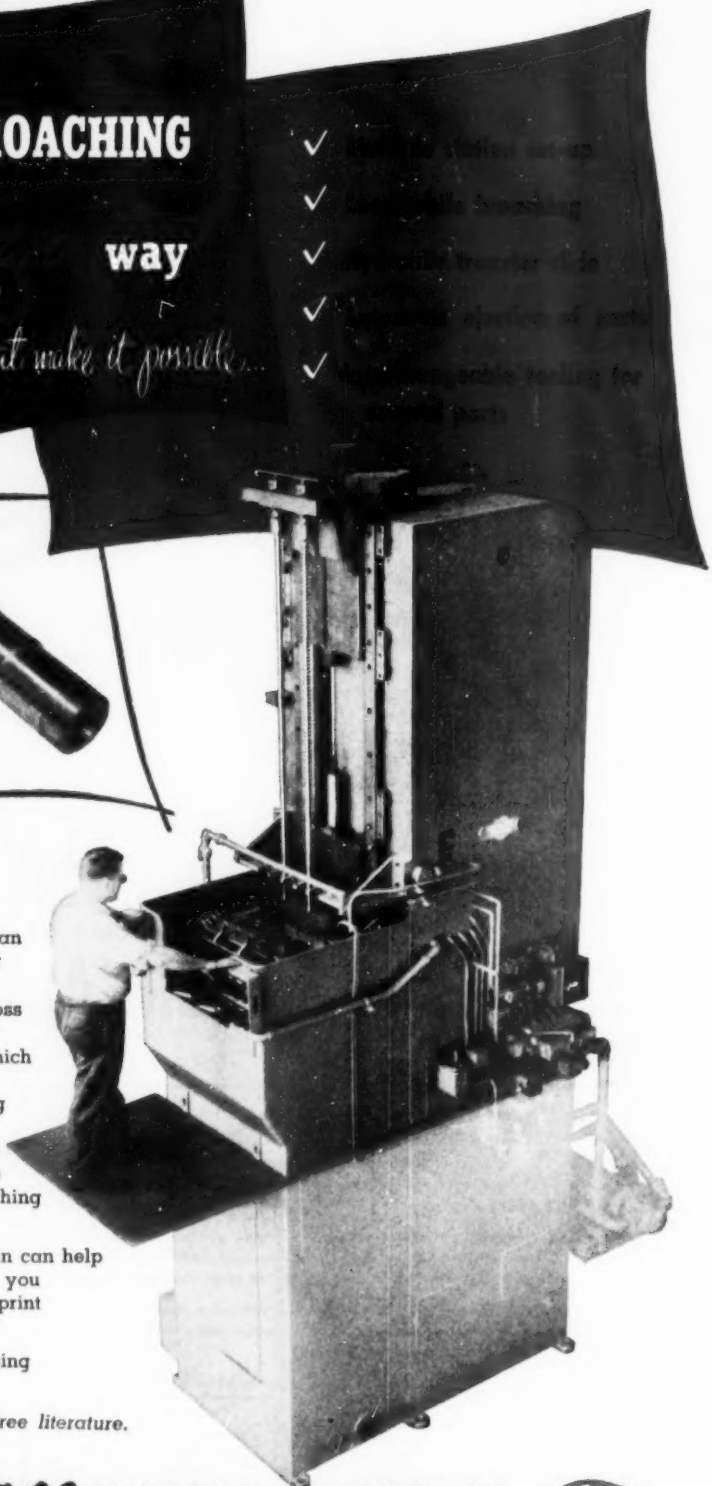
FASTER SPLINE BROACHING

the way

Check these broaching features that make it possible...

✓
✓
✓
✓
✓





Splined holes are broached simultaneously in five parts in one pass on this five-station American 40-Ton 72" stroke pull-down machine. A transfer slide permits the operator to reload parts during the broaching cycle. The parts are loaded on cross hole locating pins mounted on the transfer slide, and then moved into stationary holding jaws, which hold them in broaching position. The slide then moves back allowing the operator to reload during the broaching stroke. After broaching the parts are automatically ejected from the spring loaded holding jaws by a swinging bar. Interchangeable tooling, easily changed over, allows for the broaching of several different parts.

This machine is another example of how American can help you obtain high production with low unit cost. If you have a metal-removing problem, just send a part print and sample for a free estimate.

American *engineers and builds all three*—broaching machines, broaches and broaching fixtures.

Write today for free literature.

AMERICAN

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

SUNDSTRAND

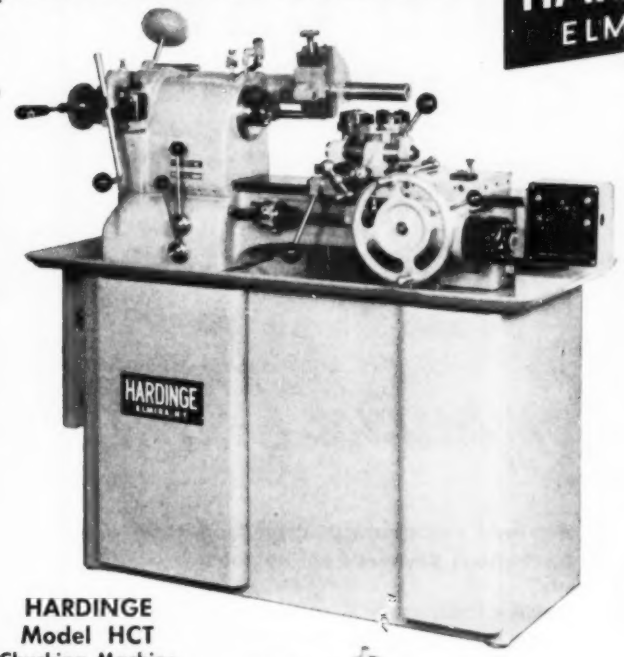
American Building - Ann Arbor, Michigan

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

Precision PRODUCTION MACHINES

HARDINGE
ELMIRA, N.Y.

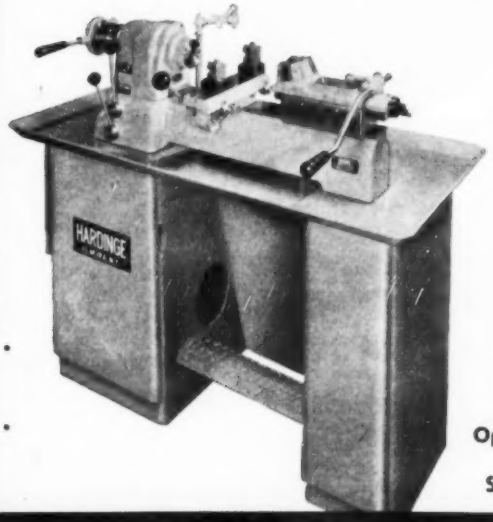
Precision TOOL ROOM MACHINES

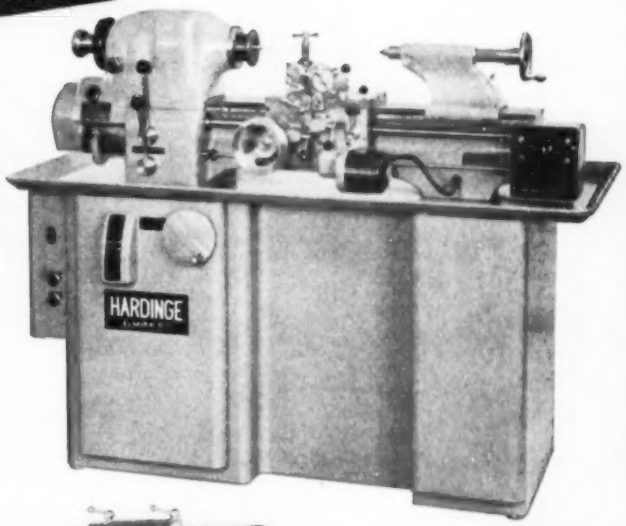


HARDINGE
Model HCT
Chucking Machine with Production Threading Head

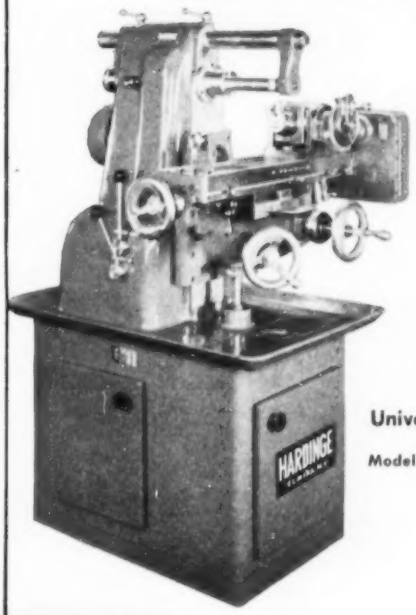
Also Model HC Chucking Machine without Production Threading Head

HARDINGE
Model DSM 59
Second Operation Machine





HARDINGE
Model HLV
Tool Room Lathe



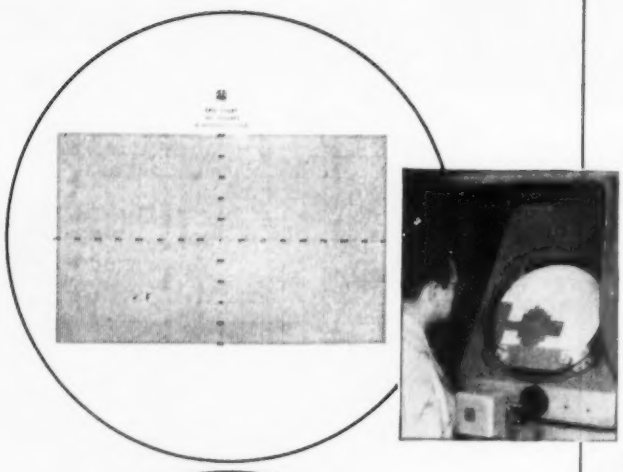
HARDINGE
Model UM
Universal Milling Machine
Also
Model TM Plain Milling Machine

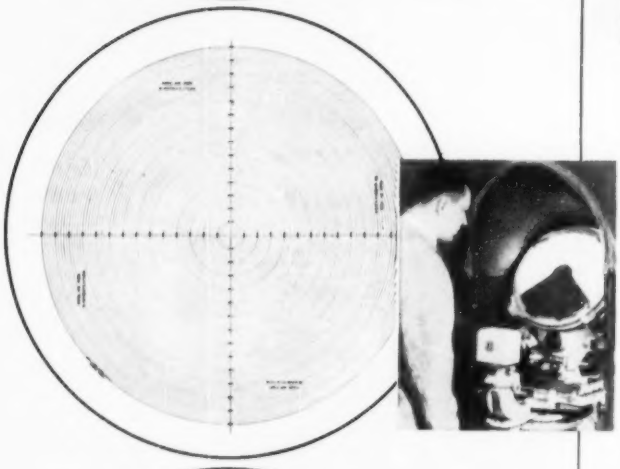
ALL MACHINES
Feature
HARDINGE Preloaded Ball Bearing Spindle Construction for High Speeds

HARDINGE
Model VBS
Second Operation Machine with Stationary Collet

HARDINGE
Model DV 59
Lathe

HARDINGE BROTHERS, INC., ELMIRA, N. Y.





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Comparator Charts

With these charts many ***Difficult Inspection Operations Become Routine Jobs.***

They are ***Invaluable Accessories*** that ***Add*** to the ***Economy*** and ***Versatility*** of the ***Comparator.***

Top Quality Materials, Expertly Processed, assure ***Uniform Density*** of ***Lines*** and provide ***Maximum Contrast Between Outline And Image.***

Made To Precision Standards Of Accuracy established during more than ***30 Years Of Specialized Optical Experience.***

Write to Dept. 710 for your copy of our Chart Catalog No. 471.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

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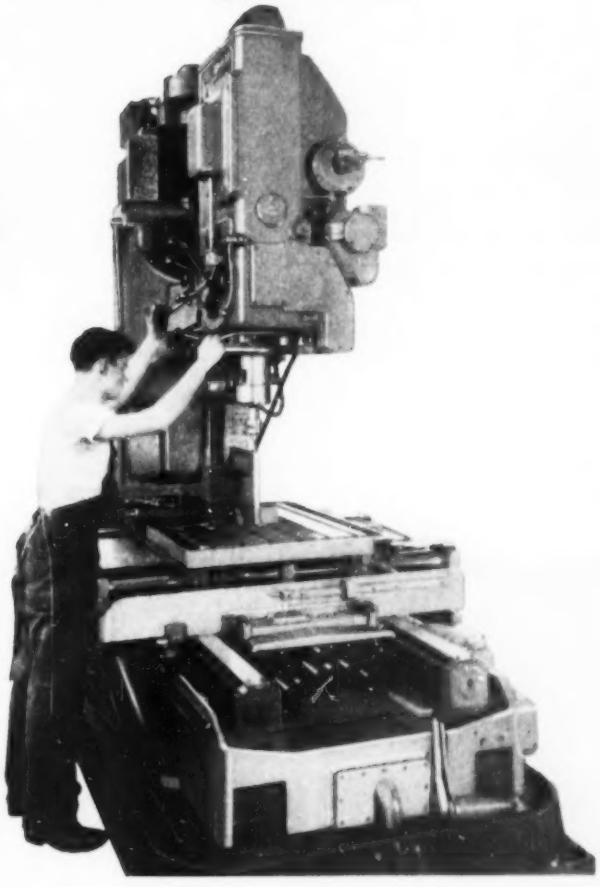
OPTICAL COMPARATOR DIV.

startling savings for you



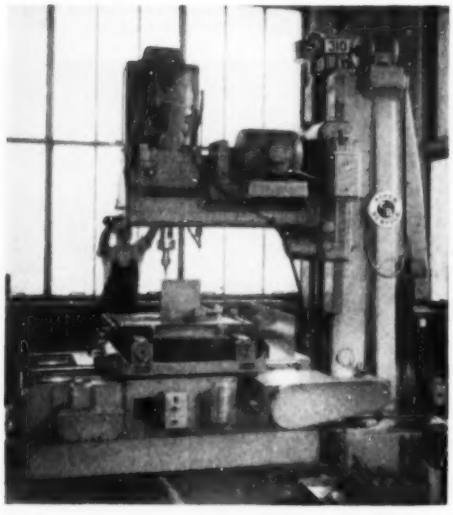


Photo courtesy The American Can Company

Time savings of many hours and sometimes weeks are effected by using the special Cincinnati Bickford fixed arm Precision Drilling Machine—with a Bullard Man-AU-Trol spacing table. Jigs and fixtures are entirely eliminated and accuracy is maintained within limits of .001". Changes from job to job are made at low cost. The results obtained with this installation at the American Can Company are being duplicated in many other plants. This combination may effect startling savings for you.

Ask for circular FH.

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Every B-36 lands on U·S·S Carilloy Steel

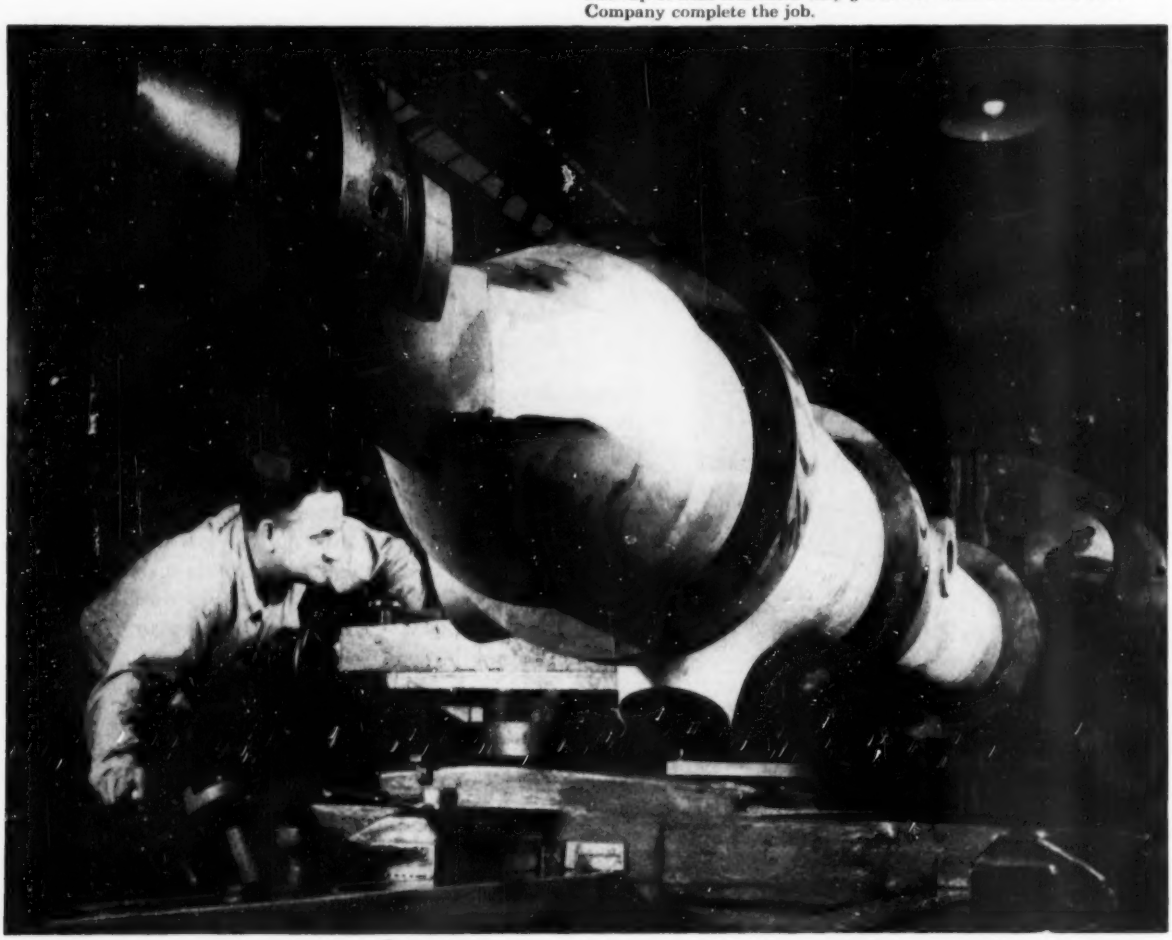
● When 179 tons of B-36 thump down on a landing strip, tremendous stresses are built up in the structural parts of the landing gear. Only the highest quality in steel can handle this tough job, which is one of the most exacting in the aircraft industry.

All of the rugged main columns for these landing gears are made from U·S·S CARILLOY electric-furnace aircraft quality ingots. This high quality alloy steel provides the great strength and shock resistance demanded in the performance of the finished part. The main columns for these landing gears are forged. The original ingot, as shipped to the forger, weighs approximately 37,500 lbs. From it are produced two columns each weighing about 1206 lbs. In other words, approximately 93% of the steel has been removed—with a mere 7% of the original ingot left to do this tremendous job. Obviously, this steel must be of the very best quality.

The same care and skill go into every ton of U·S·S CARILLOY steel that *you* buy, whether it's a giant alloy ingot or a few tons of special steel. Our experienced metallurgists keep a close check on *every* heat of steel to make sure it has the strength, hardness, toughness and machinability that's needed.

If you have a special steel problem, let us know. We'll be glad to help you with it.

U·S·S CARILLOY electric-furnace aircraft quality steel meets every requirement for these vital parts. The precision machining and expert heat treatment they get at Cleveland Pneumatic Tool Company complete the job.



NO ORDINARY STEEL could withstand the huge shock loads imposed on the main landing gears of Convair's giant Air Force B-36 Bomber. The plane has a maximum gross weight of 358,000 lbs., with still higher landing shock loads. U·S·S CARILLOY steel has more than enough impact strength to hold up under this severe punishment.

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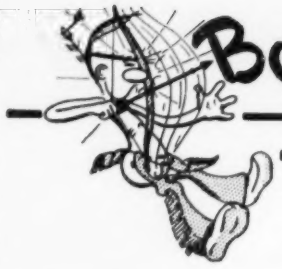

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Double Standard Again

Engineering tolerances are primarily a function of the designer; they must not be set in the shop. Where critical tolerances are involved, the designer should discuss these with the production dept prior to application, to ensure that the component can be made within desired limits.

The inspection dept should also be represented at such discussions as it will doubtless have fairly definite views on the subject; further, they will be able to give some guidance as to whether it is a feasible proposition to check that the tolerances have been maintained. It is obviously useless for the designer to put very close limits on a drawing which can neither be obtained in practice nor checked after the component has been produced.

The setting of tolerances tighter than necessary appears to be a psychological reaction of the designer. It is felt that this attitude of mind can be overcome if the inspection dept rigidly adheres to the tolerances called for on the drawing and rejects any component whose dimensions fall outside the drawing requirements. By this action the designer will gain confidence in the inspection dept, knowing that components will not be accepted outside the drawing limits, and the former may then be persuaded to widen tolerances. It is considered that the lack of confidence on the designer's part is, in general, responsible for unnecessarily tight limits often set on drawings.

It has been stated that Inspection should reject all components produced outside the limits. It is realized that such an action cannot be maintained in practice, but by using 'concession forms.' Inspection may inform the designer how it is proposed to utilize, or modify, the incorrectly produced component to avoid scrapping it. This system allows the designer to modify his records so they line up with the article produced.

Further, it is considered essential that all dimensions on drawings should carry tolerances, either individually, or preferably by general rules, with individual tolerances for special purposes.

All values of tolerances should be practical. Nothing is more likely to result in disregard of limits than the

GRINETICS

By D G SMITH

SPIRIT LEVEL

HAND PRESS

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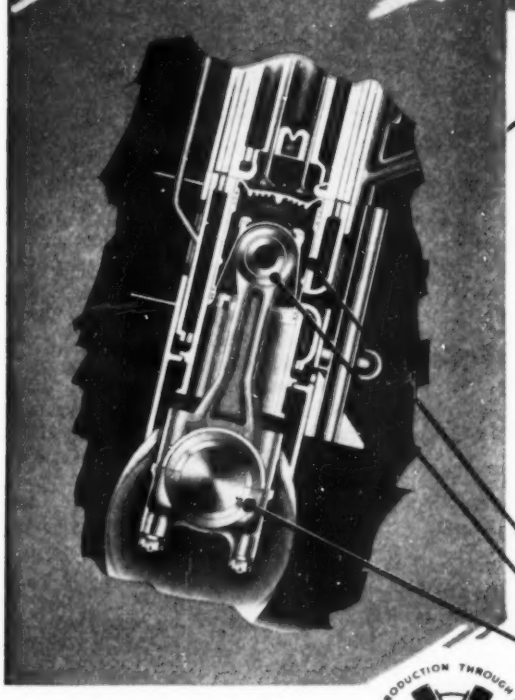

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—the connecting rod . . . all which must hold the compression and transmit the terrific thrust are MICROHONED!

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indiscriminate determination of the values of tolerances, eg, it is absurd to tolerance a bore of 10 ft. to ± 0.001 in.; equally so it is absurd to tolerance a machined component to ± 0.000 in. This latter only shows that the designer has not the courage to say what tolerance can be allowed.

Finally, there is no doubt that double standards should not be allowed to exist at all, that the designer should state tolerances which are required for the economic and satisfactory production of the article, that Production should produce within the tolerances and that Inspection should pass an article only if it is produced to the required limits.

J R Cotterill
Witton, Birmingham

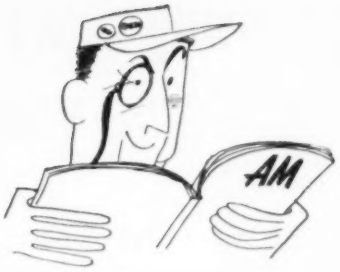
Training Material

I have followed with great interest the round-table discussions appearing in *AM*. Because we do a great deal of supervisory training, we would consider it a great favor if you would grant us the privilege of reproducing this particular page for use in training supervisors in the State of Texas. On any material we reproduce, we will be pleased to give *AM* the proper by-line, so those who utilize the material will recognize its source.

Several of the major oil companies bring supervisory personnel in groups of 20 to Austin, and we at the University conduct training in such topics as "The Techniques of Conference Leadership," "The Techniques of Group Instruction," "Human Relations in Industry," and many other phases of supervisory work. Several of the Round Tables which your magazine has carried would form excellent topics for conducting supervisory conferences. A few of them would lend themselves very well to the use of role-playing. It is with this sort of thing in mind that we make our request.

Earl M Bowler,
Ass't Director,
Industrial Education Dep't
University of Texas

Permission is granted with pleasure.
—Ed.



British Comment

I have read with interest your article, "How to Run a Grinding Machine" (*AM*—Oct 27 '52, p125).

I think, however, that there is a slight error under Internal Grinding. You state that when internal grinding, slightly harder wheels are usually needed than on cylindrical grinding. Actually, a softer wheel is required owing to the larger area of contact between the wheel and the work. This means that the pressure of contact is spread over a larger area, requiring a softer wheel to break down correctly.

Another point is the recommended surface speed of between 4000 and 6000 sfpm. Although these speeds are theoretically correct, in practice we think you will find that, for internal grinding, speeds of between 3000 and 4000 sfpm are more commonly used. For example, a ½-in. wheel would require 45,000 rpm to obtain a surface speed of 6000 sfpm. Such speeds are not impossible, of course, but light, high-frequency grinding spindles are necessary, and maintenance over, say, two or three years of service is likely to be substantial. By using a lower speed, a much more substantial spindle can be used, capable of heavy cuts with less maintenance.

William Boneham
Boneham & Turner Ltd
England

Treasury Men in Action

I should like to congratulate you on your editorial (*AM*—March 30 '53, p93). I am happy that you now agree with me that it will be up to the Treasury to take the decisive steps to changing the rules in regard to determining the amount of depreciation, since it would be most difficult to get formal approval from Congress.

I hope that some steps in the right direction will be taken in the not-too-distant future.

Ernest H Weinwurm,
Assoc Prof, Industrial Engineering
Stevens Institute of Technology

Get EXTREME ACCURACY—
Use
OLIVER ACE
Universal Tool and Cutter Grinders

Direct Reading for Clearance
—Reduces Fatigue
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Grinding cutters quickly and accurately is a must in the modern toolroom. Oliver Ace grinders have been turning out precision-sharp cutters in toolrooms everywhere for years, gaining a solid reputation for their ease, speed and simplicity of operation. The Oliver Ace is easy on the operator too, since it requires no computation yet handles a wide range of cutter grinding. It's faster on most grinding operations—the set-up is simple—the direct reading for clearance reduces fatigue, eases operators' jobs (no stoop . . . no squat . . . no squint).

Oliver Ace Cutter Grinders have proved their dependability. They're soundly engineered, efficient, and economical to operate. They easily grind the most difficult cutters—giving guaranteed accuracy—excelling on high speed and Tungsten-Carbide work.

Priced to meet your budget, the ACE excels for grinding face mills up to 15"—also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing. See our catalog in Sweet's Directory

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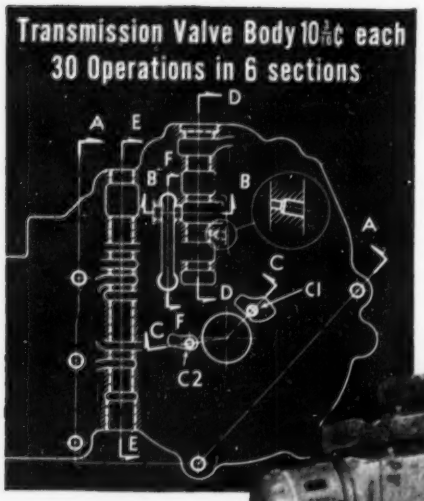
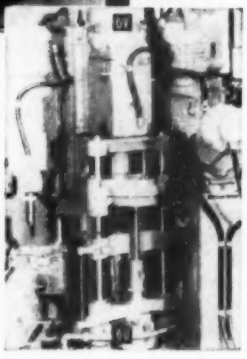


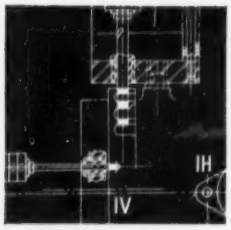
Kingsbury give you

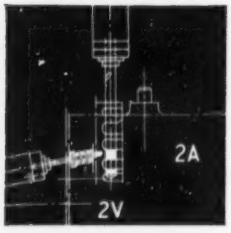


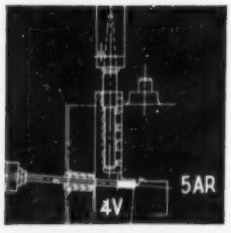
This Kingsbury central column machine has knees for mounting 3 Horizontal (H) Units and 8 Angle (A) Units. The central column mounts 11 Vertical (V) Units, one of which has two heads, one above the work and the other under it (U). Some of the units have multiple spindles. The 60-inch index table has 12 stations — one for loading and unloading.

The machine performs 30 operations: drilling, c'boring and reaming. Some of these are illustrated below.

This Kingsbury produces 176 pieces per hour gross at an average cost of 10.26¢ per piece.





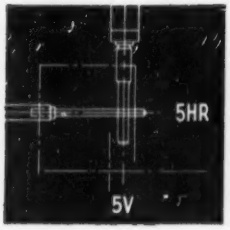


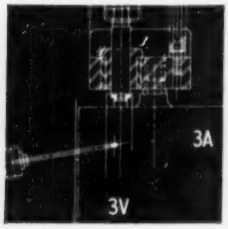
Follow this Transmission Valve Body

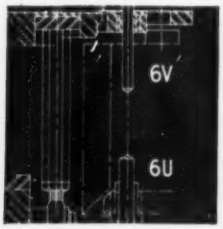
Section A: Unit 1H .281 drill — 5 thru-holes.

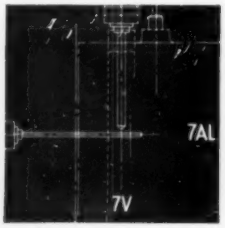
Section DD: Five vertical and three angle units prepare this long valve hole thru five walls. It must be straight, accurate, parallel with Section EE, and finished ready for borizing. Unit 1V .437 drills thru three walls; Unit 2V .437 drills thru the fifth wall. Units 4V and 5V rough- and semi-finish step-ream the hole. Unit 3V step-c'bores .812 and .640 at entrance to hole.

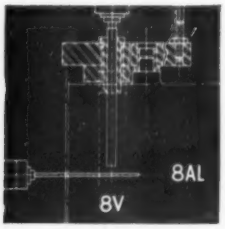
Angle units finish the port at the fourth wall. Unit 2A .156 drills 15/64 deep; Unit 3A .096 drills thru and Unit 10A .1115 reams this hole.











Special Purpose Machines are custom-built to high production at low cost

Units of 1/2 to 5 hp drill, ream, c'bore, mill, tap, thread — all accurately and economically

Operations are combined to insure accuracy, speed production, save money. The piece is chucked only once. It travels through the machine cycle, stopping successively at stations where Kingsbury Units complete their operations within predetermined time limits. At some stations several units work on the piece simultaneously. The operator loads and unloads the machine — there is no rehandling. Accurate machining reduces scrap. And think of the floor space saved!

If you have a suitable piece which requires a combination of these machining operations, it will pay you to investigate a Kingsbury. We can tell you whether or not we could develop a machine to make the piece in quantity at satisfactory cost. In fact, we would not tackle the job unless we could!

Kingsbury Machine Tool Corp.
102 Laurel Street, Keene, New Hampshire

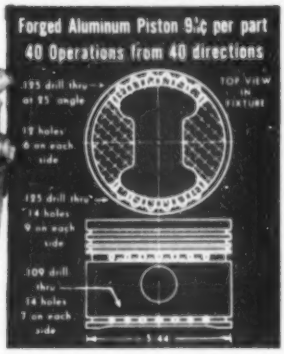
KINGSBURY

AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production

Forged Aluminum Piston
60 Pieces per Hour Gross — 9-9/10¢ per Piece

This compact machine has a 60-inch base with 6 units mounted around a central work fixture. Operator loads the part, trips a valve and watches the machine go through an automatic cycle that takes 41 seconds.

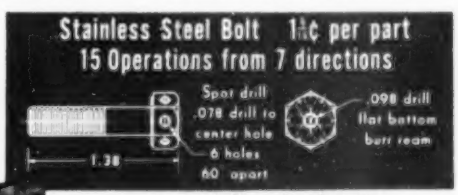
The piston indexes on its own axis. First index 26° 15′, then 5 indexes of 14° each to complete 12 angular holes in upper ring groove. Heads 1A & 4A do this work.

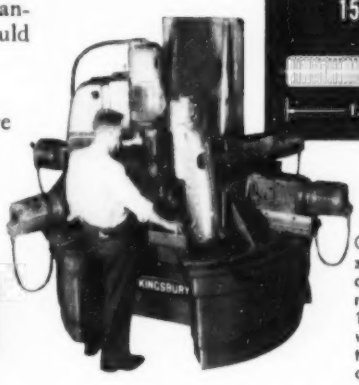


Next index 16° then 1 index of 18° and 5 indexes of 14° complete 14 horizontal holes in lower ring groove. Heads 3H & 6H do this work.

Next index 43° 30′, then 6 indexes of 15° to complete 14 horizontal holes in upper ring groove. Heads 2H & 5H do this work.

Now index 26° 15′ to bring work to loading position. Machine stops automatically, job is finished.


Stainless Steel Bolt 1¾¢ per part
15 Operations from 7 directions
Spot drill
.078 drill to center hole
6 holes 60° apart
1.38
.098 drill flat bottom burr ream



Stainless Steel Bolt
460 Pieces per Hour Gross — 1-9/10¢ per Piece

On an 80-inch diameter base, four horizontal and two vertical units spot drill, drill thru, flat-bottom and burr-ream as required. The 12-inch index table has 12 work fixtures, and each rotates clockwise. Work fixtures rotate 90° when the table indexes 30°. Bushing carriers insure accuracy.

through 30 operations — with only one chucking

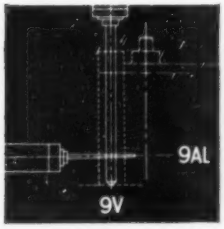
Section EE is another long valve hole thru nine walls, prepared for borizing. Vertical units perform 7 operations.

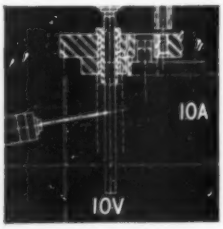
Unit 6V .422 undersize drills down thru two walls. Unit 6U .625 drills up thru ninth wall. Unit 7V .421 drills down thru three more walls. Unit 8V .4531 end-reams the hole thru five walls. Unit 9V .453 drills the hole thru. Units 10V and 11V .4687 rough end-ream and .4882 semi-finish ream the hole.

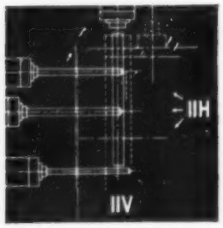
Section FF: Unit at 11H drills .343 dia. and .281 dia. partial holes shown; and four .281 dia. holes not shown.

Section BB: Unit 5H Right .312 drill thru both walls.

Section CC: Unit 5A Right .218 drills hole C1 full depth. Four Units operate on step-hole at C2; Unit 5A Left .060/.065 drills thru; Unit 7A Left .156 drills 17/32 deep; Unit 8A Left .094 drill undersize, and Unit 9A Left .094/.096 reams the hole.







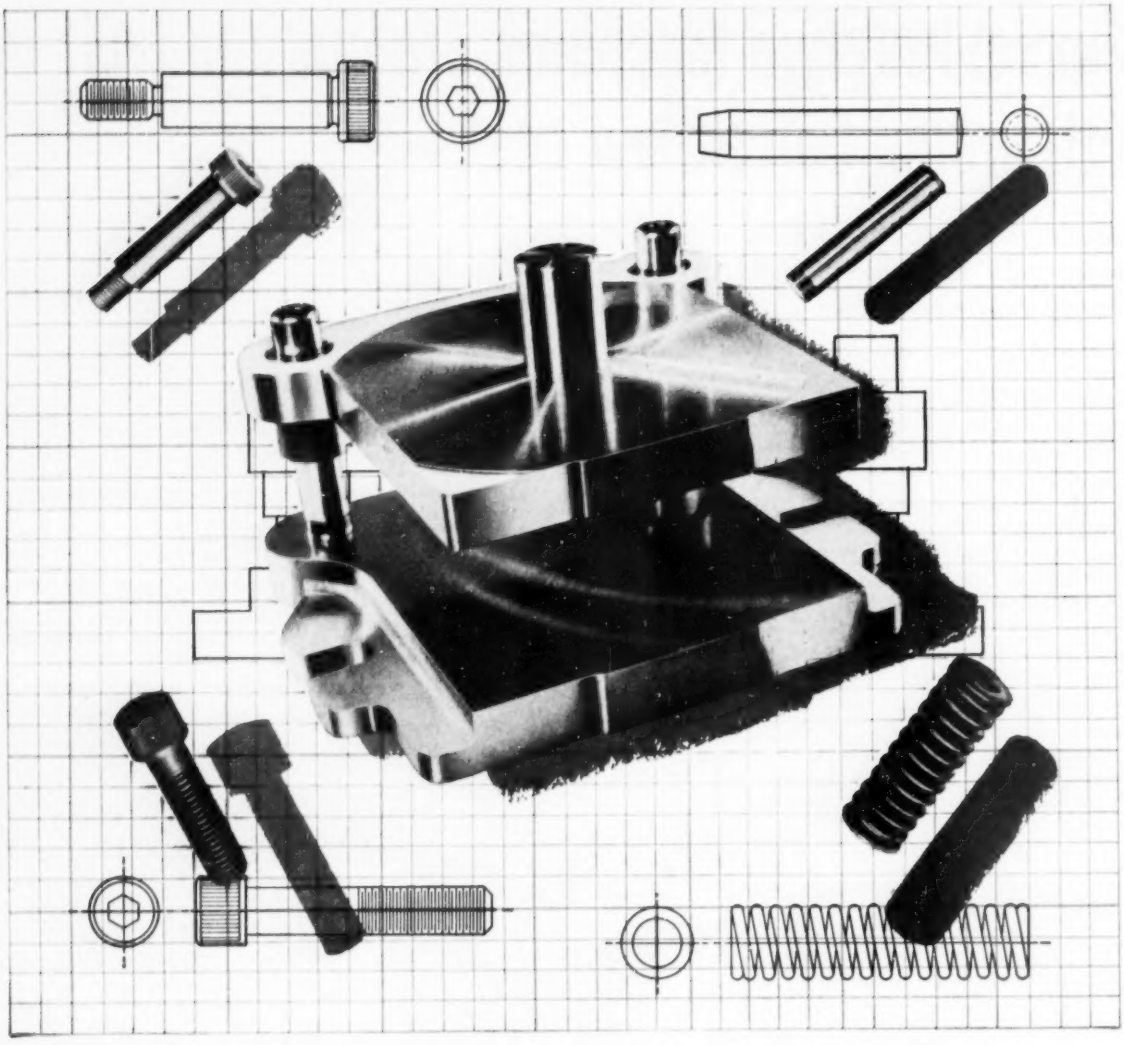
Each Unit Cost on the drawings
includes the cost of the man and of the machine — no power or overhead. We assumed:

Unit cost of man equal to:

$$\frac{\text{average U. S. hourly wage}}{\text{hourly gross} \times 80\% \text{ efficiency}}$$

Unit cost of machine to be:

$$\frac{\text{price of tooled machine}}{\text{output in 6000 hrs. @ 80\% efficiency}}$$



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SPOT NEWS of Metalworking

- **"Jet" air conditioning unit that works without a motor or compressor** and will sell at about one-third the cost of conventional home air conditioning units has been developed by two MIT scientists and will probably be on market this fall. Estimated price: $99.

An increase in industrial productivity of 10 to 15% within 2-3 years would solve Britain's chief social and economic problems, Graham Hutton, British economist, says in his new book, "We Too Can Prosper," based on an analysis of the findings of 66 British Productivity Teams that visited this country. Such an increase cannot succeed, however, without maximum joint consultation between management and labor.

- **Rate of industrial growth in Russia since 1938 has been much greater** than in U.S. or western Europe, Livingston T. Merchant, Assistant Secretary of State, Bureau of European Affairs, told the Machinery and Allied Products Institute in Washington. With 1938 taken as 100, Russia's gross national product today is estimated at 235, U.S. at 200, and western Europe at 120.

- **Fine steel wire is reported feeling the competitive effects from aluminum** and from plastic materials. More and more wire users are doing their own drawing. They are handling wire from the billet or from the heavy initial drawn wire to the size and finish wanted.

- **Norton Co's Grinding Machine Division plant at Worcester, Mass, was back in production** three days after a tornado hit it and was not totally destroyed, as newspapers reported. Grinding Wheel Division plant was not touched by the twister, hence wheel production was not affected at all.

- **Incentive system applied to all shop and office personnel has resulted in important savings** at Jones & Lamson Machine Co, Springfield, Vt, even with employees earning, on the average, over 25% above the base rate. System, administered by committee of four, has cut number of tool grinders 2/3 in 10 years, despite shift to harder-to-grind carbides. Similar benefits are reported in other departments. All shop jobs and operators are classified. Man attaining incentive rating on job classed above him earns incentive on the higher rate.

- **Canadian government has given the green light on a 1200-mph jet fighter** to Avro Canada. First step will be a $250,000 design study program for the giant delta-wing CF-104. Probable full-production date: 1960.

- **Russia is entering the large machine-tool field** with construction of a 165-ton boring mill for machining turbo-generator rotors at its Gorki plant. Also under way at Gorki is a giant machine for milling hydro-generator blades.

Aluminum alloy cartridge cases for 40mm shells are now being produced in Canada from 75S material. Material is cold-impact extruded from bar stock for the first operations. Its availability and light weight are expected to effect substantial economies and plans are being made to adopt 75S to manufacture of shells of varying calibre. The shell cases have proved satisfactory in firing tests.

- **High-speed machining is attracting considerable attention in France,** where one company has a planer operating at 500 fpm. Another machine, reported to be under construction, will operate at 720 fpm, the highest planing speed yet attempted.

- **Adaption of gas turbines to heavy farm tractors** is being considered by Allis-Chalmers Mfg Co. Unit is designed by an aircraft manufacturer, weighs 185 lb, develops 200 hp.

- **Washington is being asked to relax NPA Order M-80 forbidding sale of 18-8 chrome nickel steel.** A good supply is on hand and this inventory is becoming a headache with a lot of dollars tied up in it. Commercial demand would be heavy if rules were eased.

FOR PRECISION IN VOLUME JET BLADE PRODUCTION . . .

EX-CELL-O

Air foil forms of jet compressor blades are speedily and accurately ground on the Ex-Cell-O Precision Profile Grinder.

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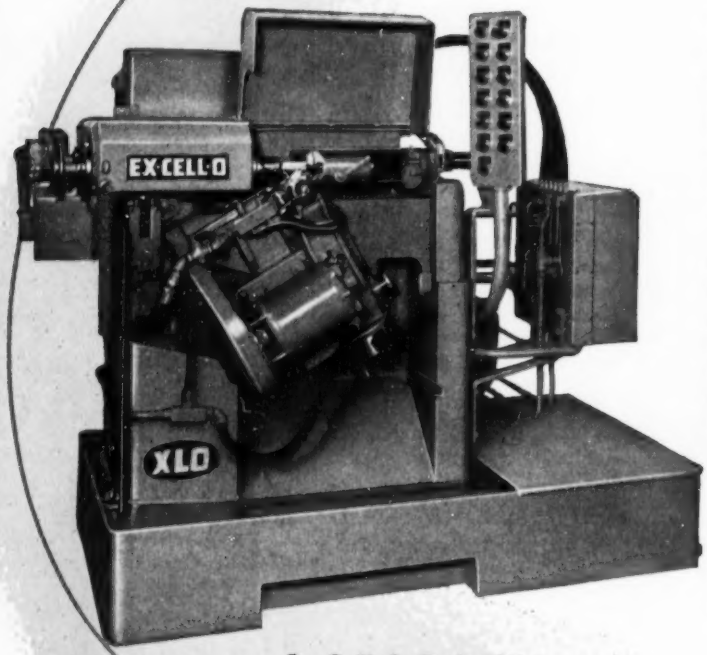

Ex-Cell-O Style 87
Precision Profile Grinder

For *precision in volume jet blade production,* you'll want the complete "Ex-Cell-O Package" of jet blade finishing machines, including this Style 87 Precision Profile Grinder. Like the Style 85 Two-Wheel Form Grinder, the Style 86 Profile Miller and the Style 88 Profile Polisher, this machine is production-proved.

The complete airfoil form, including leading and trailing edges, is accurately and rapidly ground on the Style 87. All operations, except loading and unloading, are automatic. An important feature is the automatic control of the two-speed work drive motor which slows down while the broad areas of the airfoil are ground, speeds up for grinding the leading and trailing edges.

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52-21

Washington

The Korean truce is the biggest news event in Washington since the Korean war began back in June 1950. The end of the fighting hasn't been accompanied by the usual war's-end dramatics —but the psychological impact on the politicians is all-important.

Actually, the end of the fighting solves none of the really basic troubles that beset the world and the US today. But it will give a tremendous lift to the Eisenhower Administration—a lift whose effect will be felt at least through the elections of November 1954.

• • •

Defense Secretary Wilson finally hit his stride on the military budget hearings. Prior to the testimony of General Vandenberg, Wilson has been reluctant to take a swipe at the uniformed brass for asking for too much money.

At the time Wilson got up steam, the Korea truce helped him out. The Air Force push to restore the $5-billion new money air power cuts in Congress lost a lot of support overnight with prospects of peace. Trouble was, though, that Wilson then had to caution Congressional committees from biting too deep into the military budget for next year.

• • •

Senator Styles Bridges' investigation of Kaiser's plane contracts for Willow Run have the Air Force in a spot. Inquiry brought out the fact that Fairchild was forced to teach its competitor how to build the C-119 packet, a Fairchild design, plus supplying parts for Kaiser's first 30 planes. Even so, the cost to the government for the Kaiser-produced planes was five times that of Fairchild.

Even considering the economics of a second production source, Congress doesn't think the cost difference between the two companies should be so wide. And they now wonder how come Kaiser got the C-119 contract through Air Force procurement in just 10 days.

• • •

Eisenhower's tax program has run headlong into big Congressional troubles. About the most he can get now, it appears, is a six months extension of the Excess Profits Tax. And it is not at all certain that Congress will go along with his request on this.

Other items in his tax program are going to be put over until next year. That includes holding the top corporate income tax rate at 52%, and continuing the Korean excise increases beyond the date they were to expire next spring. Personal income taxes will drop 2 to 11%. However, come January the scheduled increase in Social Security deductions will be postponed indefinitely.

Truce in Korea could mean a general let-down in business activity. Administration planners — headed by the new Council of Economic Advisors — are beginning to assemble anti-recession gimmicks and ideas from various government bureaus, just in case.

The Economic Council will have a much bigger role in such planning than it had under the Democrats. New Council Chief Arthur Burns reports directly to Eisenhower.

Under Eisenhower, the Council will try to become for the first time the watchdog of the business climate that Congress had in mind when it created the agency by passing the Full Employment Act of 1946. Under Truman, the Council tended to be a promoter of Democratic political policies.

• • •

Lobbyists for reciprocal trade and more foreign trade generally are taking a tip from the veteran political lobbyists: they're going right to the home districts of the protectionist Congressmen with facts and figures to show that the home folks—the voters—are really better off with more foreign trade than less.

Actually, it looks like Eisenhower will get a fairly good one-year extension of the Reciprocal Trade Act as is—which is about the most he hoped for. When the showdown came, the House Ways and Means Committee folded.

• • •

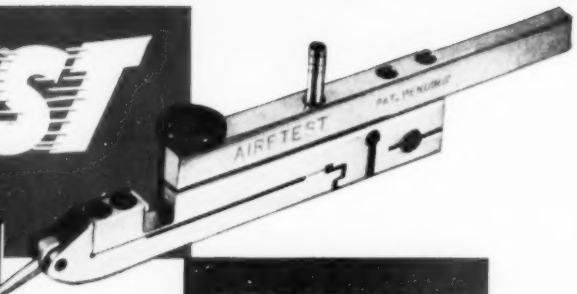
Commerce Department is converting NPA from an emergency controls agency into a permanent "business service agency." The new agency hasn't got a formal name yet. But its organization and functions have been mapped out.

It will consist of about 20 main industry divisions — including one for metalworking equipment — 10 less than NPA's old raw-material and end-product units. For the most part, the director of each division will be a private industry executive on a 6-month rotation basis.

Industry advisory committees will meet regularly with the division director to continue the industry-government contact set up under NPA. The steel, copper, and aluminum committees may be changed to "councils" like the Interior Department's National Petroleum Council. The change would give the groups more prestige.

The new agency will also have a Production Controls Division to pull the strings on Defense Materials System—issuing production directives on mills, granting priorities, allocating scarce ferroalloys, and writing the regulations. Actual metals allotments will be made by the Defense Department and AEC.

AIRETEST INDICATOR



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ACCURACY Heretofore UNKNOWN in TOOL ROOM MEASURING

Readings at any point are identical whether approach is from front, back, or either side, with this new supersensitive AIRETEST precision indicator.

Free from HYSTERESIS—no lag, no drag—a movement of a few millionths is instantly indicated.

Cannot stick—the only movement is the flexing of a steel reed pivot—no gears, rack, cams, etc.

Much greater amplification—1,000, 2,000 or even 5,000 to 1, as contrasted with 400 to 1 of conventional indicators.

No figuring to correct for stylus angle—setting to a master block automatically corrects for angularity of stylus arm in that position. Calibration is quick.

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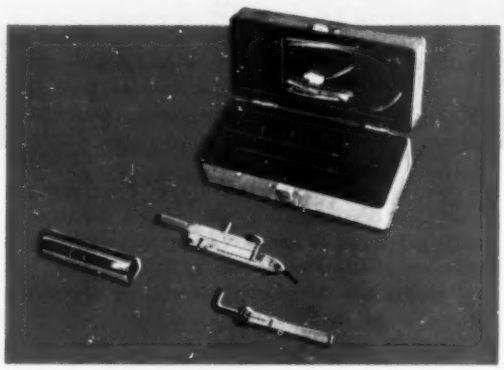

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Detroit

The large fly in the automotive ointment during early June was labor. The strike at the Warner Gear Div of Borg-Warner Corp, Muncie, Ind, was tightening its throttle hold on several car producers. Strikes and slowdowns in tool and die shops in Detroit were another headache.

Pending settlement of an argument over incentive standards and over office candidacies at Warner, the stoppage of transmission shipments was casting a shadow over production programs at Kaiser, Willys, Packard, Studebaker, others.

And, pending an agreement over wage raises in shops of the Automotive Tool & Die Mfrs Assn at Detroit, 1954 model programs were being vaguely threatened. Problems were being felt more intensely in a few places which had 1953 replacement tools in process. These were hauled out and moved, presumably, to more trouble-free havens.

At Detroit the fear across the city is that the tool-die demands would be used as a step in a leap-frog pattern by the CIO Auto Workers. First they got a dime from the auto companies for skilled people, on the grounds that the spread was too great between the captive shops in those companies and the independent outsiders.

Then the UAW began to hit the independents with the position that the gap above the captive shops had been narrowed too thin. It could go on and on like that—ad nauseum.

Meanwhile, production was limping somewhat under the burden of the Warner strike, the Ford-Canton forge strike, and scattered others. By the first week in June, the previous weekly levels of 180,000 cars and trucks a week (US and Canadian plants included) had drifted downward to a zone around 125,000. It was due for some recovery, but not all the way.

• • •

If there are any jitters over the future sales outlook, they were intensified this month by a report—apparently a little late—from the Chicago Federal Reserve, which predicted widespread cutbacks toward the end of the year and large unemployment in Michigan. But auto men continue to express optimism, despite a few foreboding signs.

The most notable of these is probably the continuing and enlarging softness in used car prices. A state-by-state poll of the National Used Car Dealers' Assn confirmed this, and added that sales are about 5% off compared with 1952. If used car prices and movement are criteria of the innate state of the auto market—as many analysts have steadily predicted—then a warning signal is up.

But you can take it or leave it. You can leave it, if you wish, on the basis of new car sales reports. New cars are moving like hot cakes.

R L Polk estimated sales of more than 600,000 cars and trucks in April, on the basis of returns from 34 states. The indication: April will be the best single month in new car and truck registration since March, 1951.

• • •

Development notes: Some companies are actively at work on overhead cam engines, eliminating push rods. One company at least has high hopes for developments in that direction. The problems are cost, noise of the gear drive, and valve lash control. If they can be solved, more rpm's can be obtained, and thus higher engine speeds, a generally sought objective, will be at hand.

And magnesium has been approved as a material for transmission cases by one large automotive manufacturer. Engineering approval, of course, does not mean use—the quotations must pass the purchasing department first. But the fact that magnesium fabricators sought an approval is a fair indication that they do not think they will be too far away from the competitive prices.

Meanwhile, Electric Auto-Lite has been hard at work on 6-volt batteries and attendant systems. The developments, said one Auto-Lite official, are interesting enough that the indicated trend toward 12-volt systems, started last year, may not only be halted, but actually reversed.

Another prediction in the industry: That by 1954 brakes on some cars will be both air- and water-cooled.

• • •

Automatic transmissions are moving down into the lower level cars. About 35% of the Fords being sold are equipped with automatics. Another 20%, incidentally, are being specified for overdrives. That is, more than half of Ford production is equipped with special power transfer components.

Power devices to make driving easier are coming along more and more. Mercury has just made power steering available. Kaiser is offering the power steering system of Monroe Auto Equipment Co., which delivers at around $130, definitely lower than anything else in the field.

Midland Steel Products Co is also tooling up, it is understood, to make a power brake for Ford divisions.

Reo Motors has formed a military engineering department at Lansing, to study and develop advance types of wheel vehicles for the armed forces.

Only ONE can be called the Finest:

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BRINGS THE HEAD *and* SPINDLE down to the work . . . not just the spindle.

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Carlton's low hung drive . . . plus *all-ball-bearing construction, centralized pushbutton control, modern lubrication, 3-unit power clamping of arm, head and column,* and Carlton's many other advantages . . . means increased 'hole' production for you.

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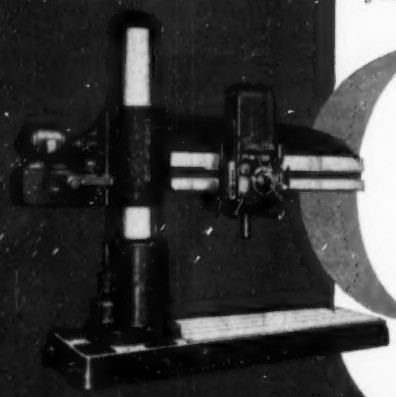


Carlton radial drills

Machine Tools

The machine tool show staged at the Canadian International Trade fair in Toronto June 1-12 was the largest on this continent since the Dodge-Chicago NMTBA Show in 1947.

It filled the building normally devoted to it each year and overflowed into most of another building. Actual display space seemed more than it was, thanks to exceptionally wide and spacious aisles.

Some 900 to 1000 machine tools are estimated to have been on display.

• • •

Several comments were heard to the effect that more machines were being shown than possibly can be sold in all of Canada in a single year. Whether true or not, the show gave that impression.

Visitors with buying power were sparse the first three days. But attendance picked up markedly thereafter.

• • •

The show, which appears to be the pet project of C D Howe, Canadian Minister of Commerce and Trade, is the center of hot debate.

Last year, the Canadian machine tool builders and the British builders boycotted it in large measure. The result was that in 1952 the Germans moved in and dominated it.

Both Canadians and British were back in force this year. Germans, too, took sizable space.

• • •

The show was not as big as the British International exhibition at Olympia last September, but bore a striking resemblance to it.

Like Olympia, the Canadian show featured displays by dealers. Many foreign builders thus exhibited their products at dealers' booths.

Main complaint was that the show, now an established yearly event, is held too often.

There are not enough changes in design from year to year to justify an annual show. At Toronto this time, most of the machines on display had been unveiled previously at the European shows at Hanover or at Olympia.

• • •

An incipient movement was afoot to ask Mr Howe to adopt a policy of showing machine tools at the International Fair only every three years. Whether anything comes of this effort remains to be seen.

Canadian builders privately are very vocal and bitter about the policy of their government in encouraging continental European and British builders to display their machines at the Fair and to sell their goods in Canada.

• • •

Mr Howe's department reportedly favors the British, after the Canadians, in machine tool purchases for defense production.

The idea is simple. If Canadians buy British machine tools, the latter will have dollars with which to buy Canadian wheat. The same set of facts applies to Germany.

Canadian builders point to Ottawa's purchases of German machine tools, which can be delivered in Canada for less than Canadian machines. The same is true, even more so, of British machines.

• • •

Government officials assert vigorously that their policy is to help Canadian builders. That help is given in the form of a duty of 22% on all importations of machines similar to those made in Canada and of 6% on machines with no Canadian equivalent.

If a British or German builder is able to leap the 22% tariff hurdle and deliver in Canada cheaper than domestic builders, then more power to him, the government contends.

Canadian Department of Defense Production probably will buy around $8 million worth of machine tools this year.

It purchased $20 million in 1952 and about $29 million during 1951 when defense tooling was getting under way after Korea.

• • •

Prospects of a Korean truce do not mean that wholesale cancellations of machine tools for defense projects are ahead.

There is no reason to believe that cancellations will be heavier than they have been.

No one knows what government purchases of machine tools will be from here on.

Best guess is that they will be slim. For one thing, the Armed Services will have a large number of machine tools back on their hands when defense contracts run out and contractors no longer need the machines.

• • •

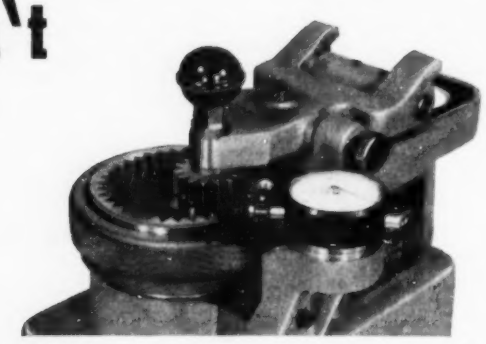
General Services Administration is in the process of formulating a policy of what to do with machine tools out on facilities contracts. The total is reported to be around $40 million.

One proposed plan is to offer the machines to contractors in whose plants they are located at the list price of the machine when new, minus a percentage of the rental already paid. The rental fee is 1% a month.

The machines not bought would be put into storage somewhere.

BF

You don't have to FIGHT these Gear Rolling Fixtures!



Did you have difficulty mounting the gear due to the spring tension that caused your master gear to interfere when you tried to mount it? Did you have trouble getting the gear out of the fixture, especially a pot type fixture for internal gears? Was the slide action so stiff or so sloppy that you were never quite certain whether your checks were accurate or not? Was the fixture awkward to use? Did face runout on your internals make your roll check meaningless?

If you have had any of those experiences, you will "take off your hat" to the new line of Michigan Tool gear rolling fixtures. They were designed to eliminate every one of those problems that have plagued the rolling fixture operator in the past.

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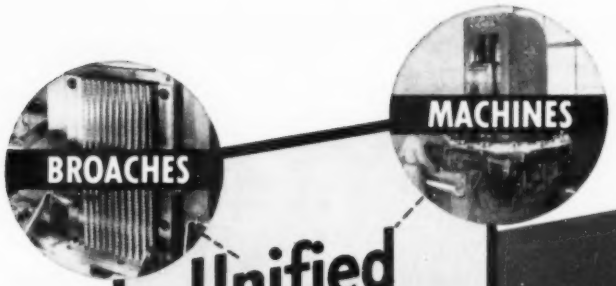

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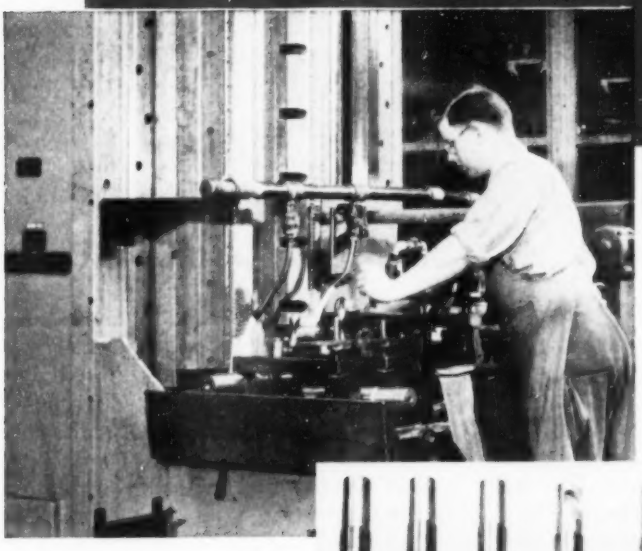

252 Operations per hour on One Machine

252 broaching operations on the four stations of their 25-ton, 90-inch stroke Colonial Dual Ram give Caterpillar Tractor Co. a production of 63 track roller shafts of either of two types per hour. Shafts are heavy steel forgings 2½" x 18" with a 4½" flange.

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COLONIAL BROACH CO. DETROIT 13

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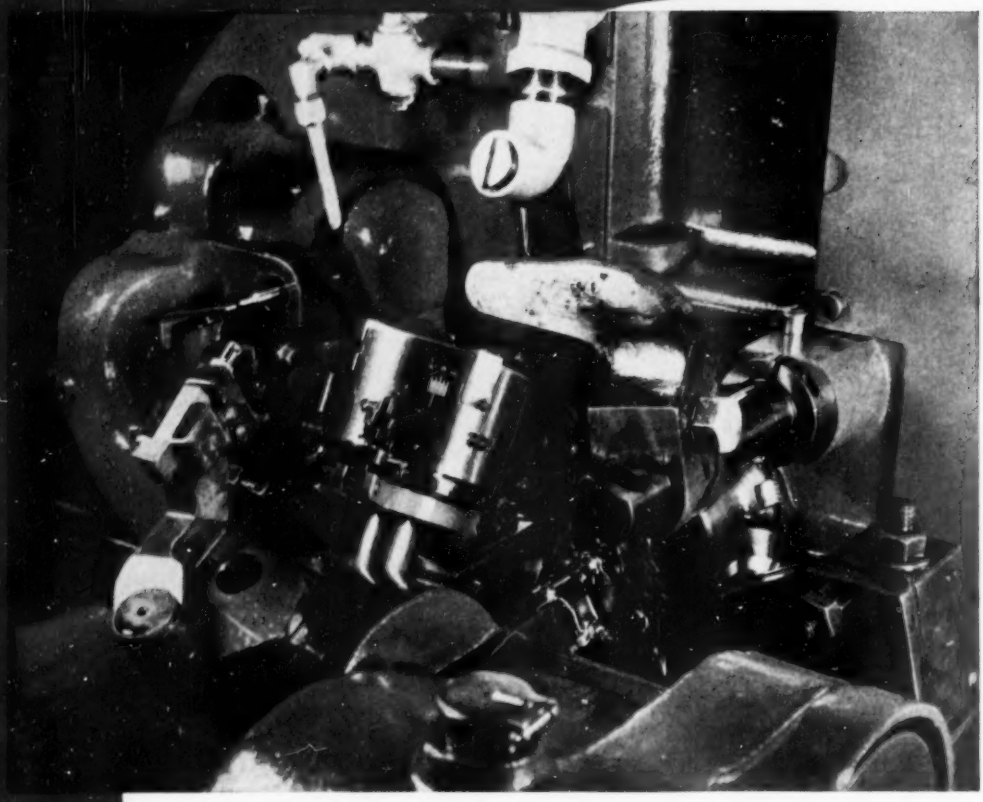

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TEXACO

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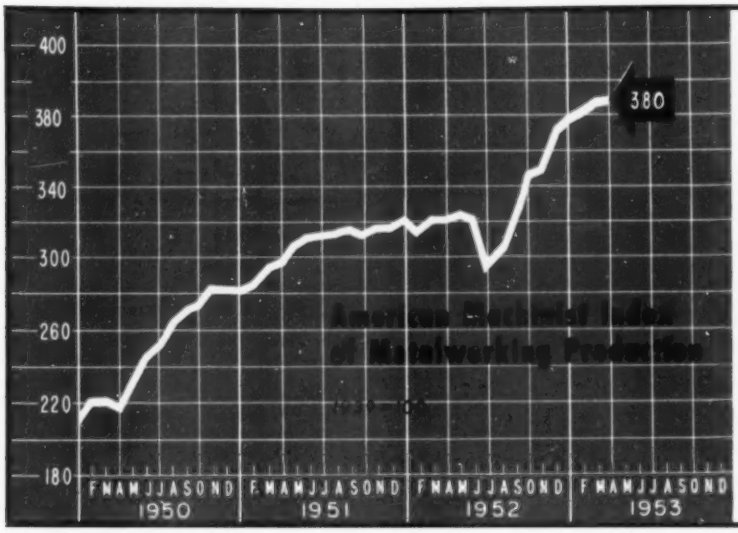
Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAY '53(*)	APR '53(p)	MAR '53(r)	APR '52
Tot. Index	**380**	**378**	**378**	**318**
Machinery	343	348	348	318
Electrical Machinery	424	420	420	350
Autos	311	308	308	226
Other Transportation	623	621	621	503
Other Metalworking	359	358	358	309

(*) Estimated (p) preliminary (r) revised

Metalworking's boom operations will be interrupted by vacation shutdowns the next two months, especially during July.

American Machinist's Index thus is bound to dip, just as it did in the middle of 1952.

It is more doubtful than ever whether production will come back up to the spring peak later in the year.

• • •

That is not to say, however, that Metalworking will not be at a very high level during the last half.

It is obvious that armament operations will hardly slide off at all, despite a Korean armistice. That is particularly true in the aircraft industry, where top management is on record with predictions of peak production ahead.

• • •

Makers of civilian goods know pretty well what's going to happen in the third quarter. Business on the whole will be near the current rate.

They are skirting around definite forecasts for the fourth quarter.

• • •

Auto parts demand, key to the automotive future, is likely to stay where it is until August. Motor car manufacturers by then will have taken a careful look at the balance of the year.

Should a cutback come, as seems inevitable, it will hit suddenly and possibly without warning.

Heavy durable goods makers continue to run at or close to full capacity. They are eating substantially into backlogs, however.

• • •

The tendency of steel users to stock up against a future rise in prices makes it hard to appraise true steel demand.

Mill books are well filled for the third quarter. At this stage little is being said about the fourth quarter.

Steel warehouse inventory is improving in numbers of items and in tonnage.

• • •

Continued declines in farm prices and increases in surpluses of farm commodities are causing some farm implement companies to reduce their production schedules gradually.

They feel that it is better to begin now, with minor layoffs and with elimination of overtime here and there, than to wait and take drastic action later.

No shorter workweeks have been put into effect, but if the trend holds for long, they will be invoked.

• • •

Sheet and strip are very strong, but the shortage is not as acute as it was a few months ago.

Heavy plate remains scarce, but should be in freer supply before the end of the year. Heavy rounds will not ease as long as defense shell production continues at the present pace.

• • •

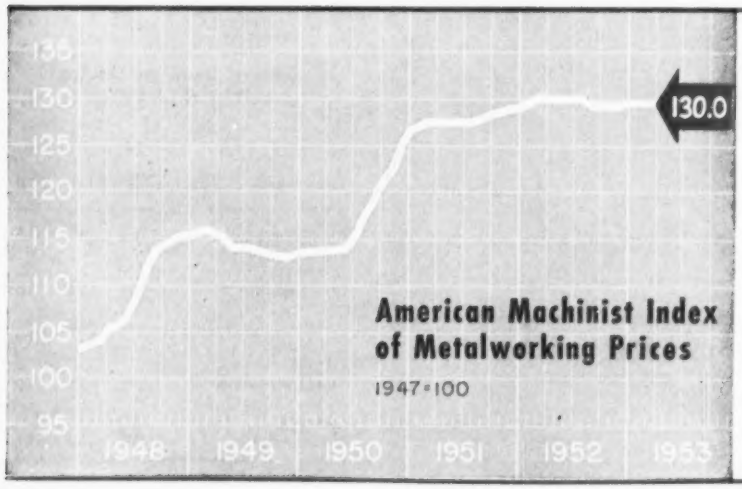
Electronics has been booming all year. New orders, however, are not as plentiful as they were and some curtailment of production looms.

Television set makers are having a big year. But output the second half probably will not come up to the first half.

• • •

Caution is the watchword with respect to inventories of raw materials and components. Complaints about shortages of metals have almost disappeared.

Gaging Business



PRICE INDEX

	MAY '53(*)	APR '53(p)	MAR '53(r)	APR '52
Total Index	**130.0**	**129.9**	**129.6**	**129.7**
Metalworking Machinery	**138.9**	**137.9**	**136.6**	
Other Machinery exc. Electrical	**133.7**	**132.8**	**132.5**	
Electrical Machinery	**126.3**	**124.8**	**125.9**	
Fabricated Metal Products	**127.2**	**127.6**	**127.9**	

(*) Estimated (p) preliminary (r) revised

New plant and equipment purchases this year may top the predicted $27 billion mark. Government experts anticipate expenditures will reach new highs in the second and third quarters.

In all, manufacturers expect to spend 7% more on plant and equipment this year than last year. Non-durable goods makers expect to show an even greater increase.

• • •

Civilian employment, estimated at 61.7 million in May, was about 430,000 higher than in April. Neither agricultural nor non-agricultural employment has shown significant change recently.

• • •

Personal income was at a new peak in April — just over $283 billion. Slight rise in non-farm income was offset by declining farm income.

• • •

Business inventories at all levels of distribution — manufacturing, wholesaling, retailing — were $77 billion at April's end.

Allowing for seasonal variations, this represented an increase of $645 million over March. On an annual basis, this would project out to a jump of $7.7 billion over 1952.

Two-thirds of the inventory increase was in durable goods. Retail auto dealers alone increased their stocks $150 million.

• • •

The public plans to buy more this year — autos, appliances and houses included — a Federal Reserve Board survey shows.

This indicates that most people think incomes will be at least as high in 1953 as in 1952, the survey shows.

And, according to the Federal Reserve survey, about four out of five people think that prices will be stable for the rest of the year, or will be lower.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	257.5	257.2	222.6
Steel, ingot operations (thousands of tons)	2,252	2,246	254
Electric power output (million Kilowatt hours)	8,096	7,961	7,005
Production of automobiles and trucks	136,157	125,868	128,807
Engineering construction awards (*Eng. News-Record*—millions)	$368.7	$215.2	$243.9

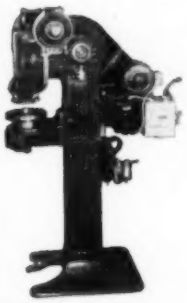
QUARTERLY BUSINESS INDICATORS

	Latest Quarter	Preceding Quarter	Year Ago
Gross National Product (billions)	$361.0	$359.0	$339.7
Profits after taxes in primary iron and steel industry (millions)	$257	$127	$235
Profits after taxes machinery (except electrical)	$212	$140	$175
Profits after taxes electrical machinery industry (millions)	$243	$239	$245
Profits after taxes in motor vehicles and parts industry (millions)	$278	$198	$211
Motors and generators new orders index (1936 = 100)	487	490	517

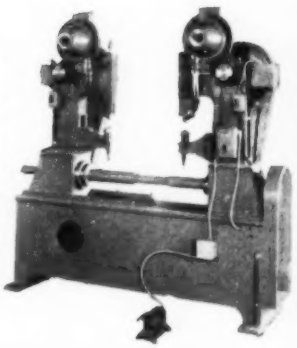
* Seasonally adjusted

Speed Production... Automatically with T-J

RIVITORS



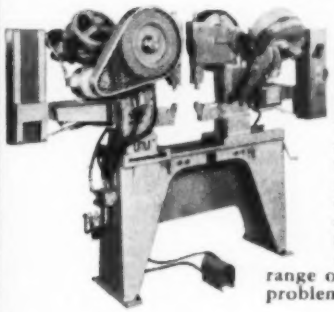
T-J RIVITOR used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.



DOUBLE RIVITOR sets two rivets at a time! Equipped with 10" hoppers, and tooled to automatically feed and set two ¼" dia. x ⅝" long wagon box head rivets at a time in elevator chain and raddle or elevator flight assemblies for farm implements. Controlled by one foot pedal.

CLINCHORS

T-J CLINCHOR . . . one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. Feeds and sets $^{11}/_{16}$" square cased nuts in outside quarter panels, left and right hand.



DOUBLE CLINCHOR sets two nuts at once! Tooled to feed and set ¾" x ⅛" x $^{1}/_{16}$" thick Fabri-Steel nuts at each operation. Both Clinchors tripped by same foot-operated valve. Adaptable to wide range of clinch nut setting problems.

Boost production . . . save labor with T-J Rivitors and Clinchors for many assembly jobs today . . . in aircraft, automotive, farm machinery, stampings of all kinds.

T-J CLINCHORS set clinch nuts 3 to 5 times faster! Fully automatic . . . controlled by a single foot pedal! Available in Underfeed and Gravity feed models, throat depths 8" to 36".

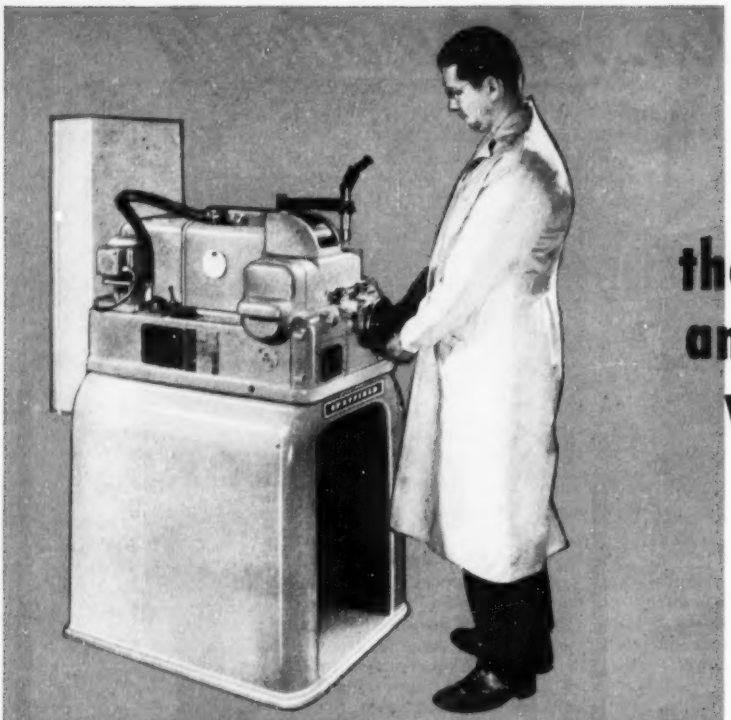
T-J RIVITORS automatically feed and set solid rivets . . . with high production! Electrically-powered Rivitor sets $^{1}/_{16}$" to ¼" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅛" diam. and up to ¾" long. Throat depths 8" to 36".

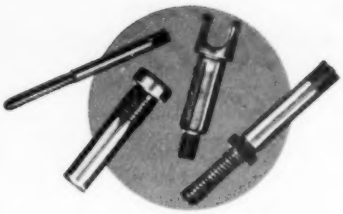
37 YEARS EXPERIENCE

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Co., Jackson, Mich.

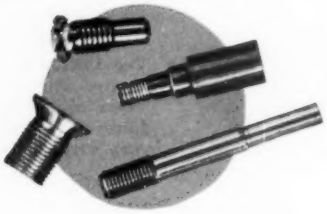
TOMKINS-JOHNSON T-J

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS





those small threads and intricate forms where precision is a must...



now you can get them at production speed and economy

The "world's smallest thread grinder", Sheffield's #133, requires floor space of only 30" x 50".

It is vital for low cost high production of small precise ground threads and intricate forms used in radar, guided missiles, telephone equipment and instruments of all types. It accurately grinds thread plug gages, taps and even micrometer spindle threads.

The multi-ribbed wheel dressed by the Sheffield Diamond Dresser assures high production and accuracy of form on threads of 12 to 120 pitch.

Accuracy of lead is controlled through the quick-change quadrant gear sector driven by the master lead screw.

Hollow live center workhead spindle permits work longer than the normal machine capacity and up to ¼" in diameter, to be loaded without disturbing the tailstock setting. Change over from live to dead center spindles can be made in seconds. Operation is simple—one operator can handle two or four or more machines—and he need not be an experienced grinder.

Collet capacity is ⅜"—maximum distance between centers is 4".

Write for Catalog #133-52.

SHEFFIELD MODEL 133 Thread And Form Grinder

6111

SHEFFIELD HEADQUARTERS

the *Sheffield* corporation

DAYTON 1, OHIO, U.S.A.

GAGES • MEASURING INSTRUMENTS • MACHINE TOOLS • CONTRACT SERVICES • THREADING TOOLS

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

After Korea—What?

Surely there is no one who does not have a feeling of relief and thankfulness that the fighting by American boys in Korea promises to end.

For American industry, as well as for the American people, it should be a time for rejoicing.

For the truth is that in too many recent years industry has been forced by necessity to gear its activities to a war economy. And no matter how you look at it, industry, including Metalworking, is far better off operating under peacetime conditions than it is in wartime.

THE IDEA that industry prospers in wartime and therefore welcomes war is a myth. As it does to every individual American, war brings many unpalatable problems and dangerous risks to industry.

It is a time of controls on materials, manpower and prices. It is a time of excessive taxation. Freedom of operation is seriously curtailed, and so are profits. Washington dictates what industry should do. A manufacturer's normal business often is completely put aside, and later he must carefully rebuild it, hoping to get it back to where it was.

Thus the promise of an end to the fighting in Korea is welcome news. And despite the constant preachment of Malenkov and his associates that the American economy thrives only on war, there is no danger ahead that Metalworking, or any other segment of industry, is likely to fall on its face.

MANY FACTORS give strength to Metalworking to calm those who might be nervous about the prospects. For one thing, we are committed as a nation to a sizable defense establishment as a permanent policy.

In fiscal 1954, starting July 1, defense expenditures will be $42 billion, or within $1 billion of what it would be if the shooting in Korea should go on. In addition, the Defense Department has unexpended production commitments totaling $85 billion.

The aircraft industry foresees full operations in 1953 and 1954. Plane makers have issued statements that there will be no letdown in their work.

Automobile companies are heading toward a 7-million-unit year or better. And key men in the motor car industry have predicted healthy production and sales over the next few years. What's more, they are spending hundreds of millions of dollars for new models and for expansion and modernization of facilities.

WHAT'S GOING on in automobiles is happening elsewhere. Money is being freely poured out by industry with faith that such outlays will be justified. We have a rapidly expanding population and an expanding economy.

This is not to say that operations will not drop off somewhat from the present boom level. That will be in the nature of a breather and does not mean that anything is essentially wrong.

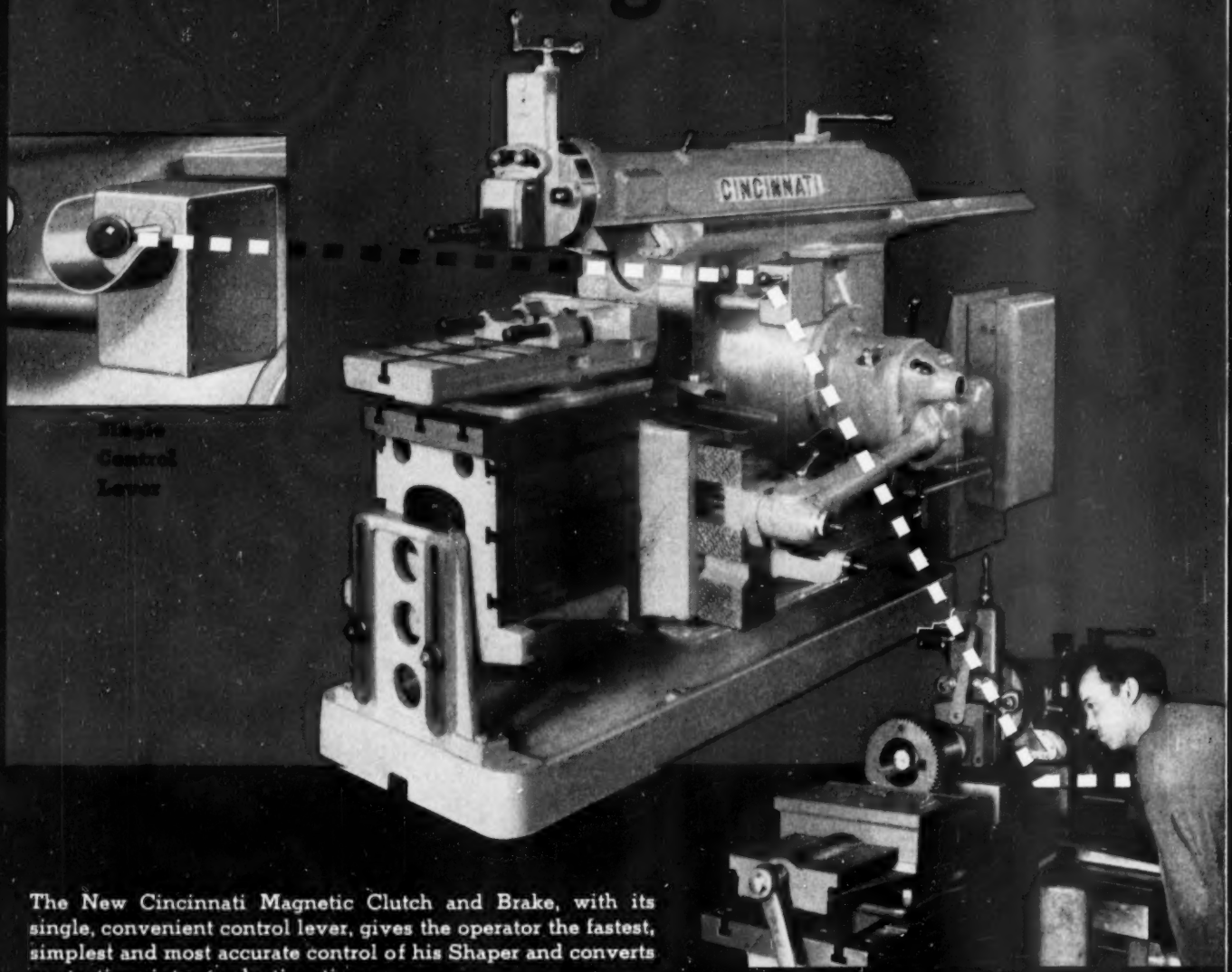
Our standard of living is the world's highest. It is the envy of other nations. It was not attained by benefit of a wartime but rather a healthy peacetime economy.

We can keep it where it is and raise it still higher only by putting into our peacetime competitive economy the same degree of energy that we pour out by necessity in wartime.

Does any Metalworking management doubt our ability to do just that? Busy days are ahead. But they should be rewarding ones.

Burnham Finney

Outstanding Time Saver...
...Outstanding ACCURACY



The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, gives the operator the fastest, simplest and most accurate control of his Shaper and converts waste time into productive time.

This powerful clutch and brake requires no adjustment, and has a long, maintenance-free life.

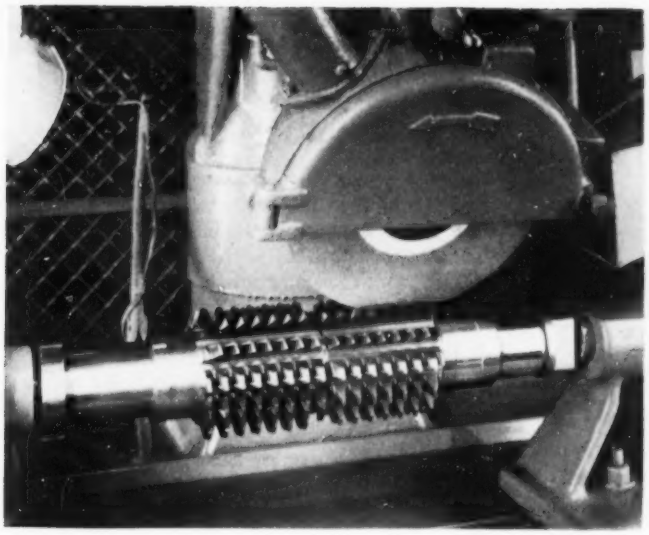
Write for Cincinnati Shaper Catalog N-5.

30% Time Saving

Shaping time on 7 internal oil grooves in these steel sleeves was reduced from 12.5 minutes to 8 minutes, by the Cincinnati Electro-Magnetic Clutch and Brake.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES



HOBS ARE SHARPENED two at a time on No. 4 Barber-Colman automatic grinders, using 10-in. Sterling KA60-H15-V1759 or Macklin 26A60-15-V6 wheels. For greatest economy, hobs requiring the same amount of grinding for resharpening are paired for this operation

GAGES CUT HOBBING COSTS $30,000

BY R L WITSCHE, MECHANICAL ENGINEER, LOUISVILLE WORKS, INTERNATIONAL HARVESTER CO

Studies initiated by statistical quality-control program led to development of checking devices to minimize stock removed when resharpening HSS hobs

SUBSTANTIAL increases in hob life per gear cut have been achieved at the Louisville Works of International Harvester Co by installing a hob quality-control program. As a result, records show a reduction of some $30,000 in annual costs.

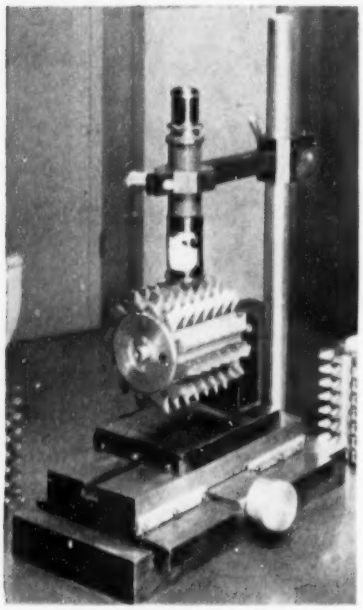
These improvements result from studies of hob inspection and sharpening techniques initiated early in 1951, when it was decided to try out statistical (SQC) methods for controlling cutting-tool costs. Carried out by mechanical-engineering personnel working in cooperation with the plant gear division and A C Richmond, general supervisor of inspection-methods research from the company's Manufacturing Research Dept in Chicago, these studies soon showed the need for better methods for measuring the amount to be ground off the faces of hob teeth when resharpening, and for checking and recording the amount actually ground away.

First hobbing operation analyzed was the cutting of two sizes of bull gears for transmissions used on Model A and Model C Farmall tractors. These 5½-DP gears are cut in a battery of six Gould & Eberhardt hobbers, and the hobs are used at random on any of the machines. One gear has 75 teeth, with 13.6364-in. PD and 1 5/16-in. face; the other has 76 teeth, with 13.8182-in. PD and 29/32-in. face. Because of this difference in face width and number of teeth, machine loads consist of eight large gears or eleven small gears, so the length of cut per shift of hob is approximately the same for each stack. Blanks are high-carbon-steel forgings machined to size before hobbing.

To simplify charting of hob wear for statistical analysis, it was decided to use, as the unit of measurement, the number of lineal feet of cut per 0.001 in. of stock removed from cutting faces of the hob when sharpened. The lineal feet cut is determined by taking one-twelfth of the face width of the gear (in inches), times the number of teeth in the gear, times the number of gears cut between sharpenings.

Procedure for sharpening the 4-in.-OD, 5-shift hobs is to mount them two at a time on the arbor of a No. 4 Barber-Colman automatic hob grinder. Feed is set to remove about 0.0005 in. per pass. In such setups, the stock removed must be enough to sharpen the duller of the two hobs. So, unless hobs are paired so approximately the same amount will be removed from each, an excessive amount will be ground from one.

When this study was started, pairing of hobs to be sharpened was left to the operator. He had no instruments to measure the amount that should be ground from each hob to sharpen it correctly, so he used visual inspection and, in consequence, the pairing was usually poorly done. Today, each hob sent to the grinders for resharpening carries a ticket showing the proper amount of stock to be removed, and correct pairing is a simple operation.



PRECISE OPTICAL MEANS for measuring wear on hob teeth was necessary to set up controls for sharpening operation, so this gage was designed and built at the Louisville Works. Brinell gage originally used has been replaced with monocular microscope

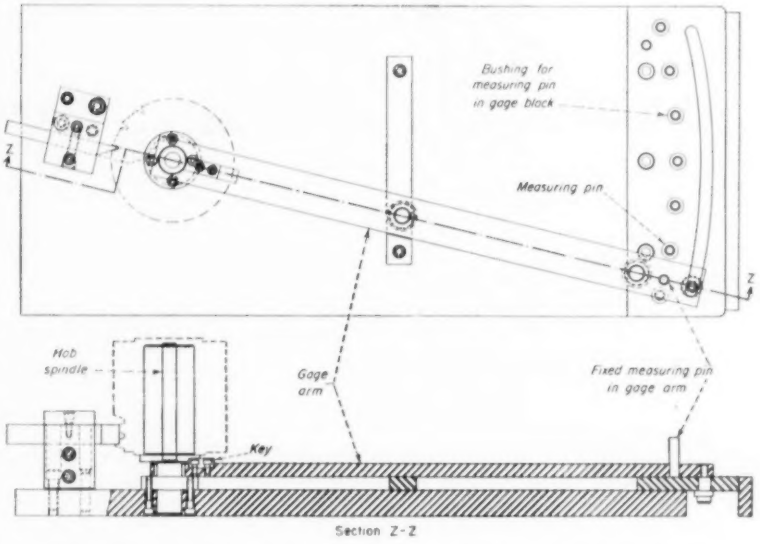
First step was to develop an instrument to measure hob wear and thus determine the amount of stock to be removed. It consists of a stand for supporting an optical instrument to provide an enlarged view of the cutting edge of one tooth, a support for the hob, and a micrometer slide to permit precise adjustment of the hob under the microscope. As a temporary expedient, a Brinell gage was used in the first of these hob-wear gages —it since has been replaced with a monocular toolmakers' microscope having a reticle graduated to 0.001 in.

Next, it was necessary to provide an instrument to check the amount of stock actually removed by the tool grinder. The instrument developed at Louisville supports the hob on a vertical bushing, locating it from its keyway, and providing for locating the hob against the face of one tooth while measurements are made with a micrometer across pins. The gaging pins are 20 in. away from the center of the hob, providing a 10-to-1 reading of stock removed when checking a 4-in.-OD hob. This ratio is, of course, somewhat larger when smaller hobs are checked. Three sizes of bushings are provided so hobs with different bore sizes can be inspected.

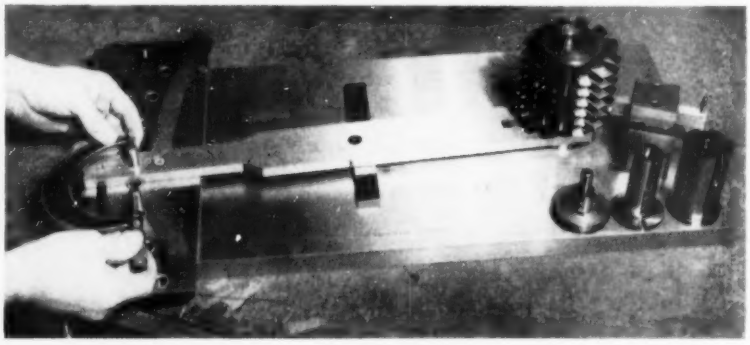
The stock-removal gage checks the position of one hob tooth with relation to the keyway in the bore. New hobs are measured with this gage, and the reading noted on individual Hob Record cards. After each resharpening, this check is repeated and, by subtracting the amount removed each time, is determined and noted on the proper cards.

When we were thus able both to determine the amount of stock that should be removed when resharpening a hob, and to check the amount of stock actually removed, we discovered that the average amount removed was considerably more than that specified on the hob tags. Study of this condition brought to light the fact that the hob grinders were not equipped with feed-measuring devices, and the operator in each case had to guess at the amount of stock being removed.

By mounting a 0.0001-in. dial indicator in the headstock of the grinder, the operator was provided with means for determining the



STOCK-REMOVAL GAGE can be used for checking hobs of 2- to 5-in. OD with 1- to 2-in. bores. Stop blade in support block is adjustable for hobs of different dia and always contacts hob at same position, as hob is located from its keyway. Seven hardened bushings are located in gage block at other end of instrument so 0.500-in.-dia pin can be positioned for most convenient checking of gage arm location with micrometer



SPECIAL GAGE designed and built at the Louisville Works for checking stock removed by grinding operation checks position of face of hob tooth with relation to keyway in hob bore. Arbors for centering hobs on gage are keyed to gage arm to maintain position

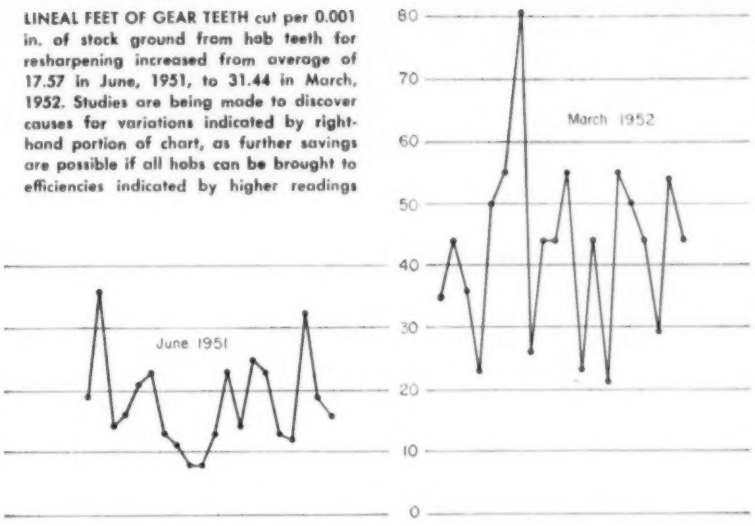
amount of stock being removed. The indicator is supported by a bracket and bears against the sine bar in the headstock at a 4-in. radius. Reading of the indicator thus shows twice the amount a 4-in.-OD hob is fed toward the grinding wheel from the dressing position. Other conversion factors must be used when sharpening hobs of other OD sizes.

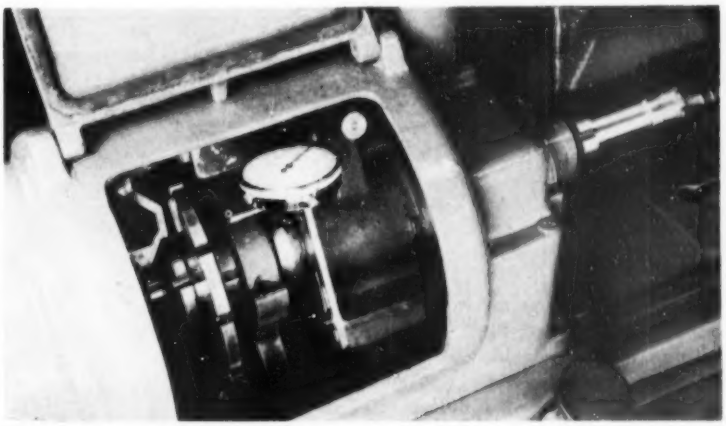
The accompanying chart shows a portion of two quality-control charts from one of the gear hobbers covered by the original study. The left-hand portion is from a chart started at the beginning of the study; the right-hand portion from a chart made up nine months later.

To provide a base for comparison, a record was kept of the number of gears hobbed, and the amount of stock removed for hob sharpening during a normal three-week period in June, 1951. The average lineal feet of cut per 0.001 in. of hob stock removed for all six hobbers was found to be 17.57. A similar check was made for the first three weeks of March, 1952, and this average was found to have increased to 31.44 ft, an improvement of 78.9%.

At first glance the right-hand portion of the chart appears to show less control than the left-hand portion. However, the right-hand chart is a true reflection of the variation from one sharpening to another of the amount of stock

LINEAL FEET OF GEAR TEETH cut per 0.001 in. of stock ground from hob teeth for resharpening increased from average of 17.57 in June, 1951, to 31.44 in March, 1952. Studies are being made to discover causes for variations indicated by right-hand portion of chart, as further savings are possible if all hobs can be brought to efficiencies indicated by higher readings





BRACKET INSIDE HEADSTOCK of Barber-Colman hob grinder positions 0.0001-in. dial indicator so it contacts sine bar at 4-in. radius to measure amount hob is fed against wheel when sharpening. Thus operator can easily tell when specified stock has been removed

Form DX-146. 2M—1-29-52.
Printed in United States of America

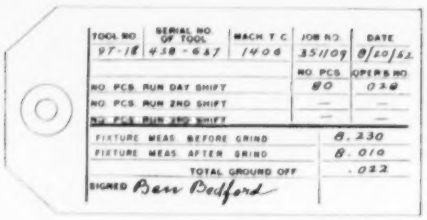
HOB RECORD

HOB LOT No. 438 - 637 S. R. No. 91-18 #27

TYPE Gear DESCRIPTION Ground CLASS B PITCH 5-1/2 PRESS ANGLE 20° O + P .4373 THREAD ANGLE 5°14'
NO. THREADS 2 HAND RH NO. GASHES 12 GASH-LEAD Straight GASH-HOOK Rad. O.D. 4-1/2" LENGTH 4" BORE 2" T.P.F.
LAND NO. SHIFTS 5 AMOUNT OF SHIFT 1.147 DATE PUT IN SERVICE 3-25-52 DATE SCRAPPED
REASON FOR SCRAPPING

DATE	PART NO.	MACH. NO.	OP. NO.	NO. T.	NO. PCS.	FIXTURE MEAS.	LINEAR INCHES	AMOUNT GROUND OFF	PCS. PER SHIFT	CHECK NO.	REMARKS
3/25	351109	L01405	88	75	80	12.410	7.875	.015	16	48-888	
3/28	"	1406	"	"	"	12.260	"	.018	"	893	
4/1	"	1401	"	"	"	12.080	"	.024	"	888	
4/4	"	"	"	"	"	11.840	"	.030	"	823	
4/9	"	1405	"	"	"	11.690	"	.015	"	823	
4/15	351809	"	80	76	110	11.490	7.576	.015	22	008	
4/22	351109	"	80	75	80	11.390	7.875	.021	16	086	
5/1	"	1401	"	"	"	11.130	"	.015	"	002	
5/5	"	"	"	"	"	10.980	"	.018	"	002	
5/9	351809	1404	80	76	110	10.838	7.576	.023	22	002	
5/14	351109	1406	80	75	80	10.605	7.875	.015	16	002	
5/20	"	"	"	"	"	10.450	"	.078	"	003	MACHINE FAILED TO INDEX.
5/21	"	"	"	"	"	9.670	"	.022	"	002	
5/27	"	"	"	"	"	9.452	"	.018	"	002	
6/7	"	"	"	"	"	9.270	"	.018	"	002	
6/10	"	1401	"	"	"	9.090	"	.013	"	002	
6/16	"	"	"	"	"	8.967	"	.016	"	002	
6/27	"	"	"	"	"	8.805	"	.020	"	045	
7/2	351809	1405	80	76	110	8.603	7.576	.024	22	002	
6/7	351109	1401	80	75	80	8.368	7.875	.013	16	002	
8/20	"	1406	"	"	"	8.230	"	.023	"	028	
11/21	"	1401	"	"	"	8.010					

CLERK IN GEAR-CONTROL laboratory maintains record card for each hob, taking readings for each operation from tags which accompany the hobs to the shop and to the hob grinders. Hob covered by above card should have sufficient stock for ten more sharpenings



TOOL NO	SERIAL NO OF TOOL	MACH. T. C.	JOB NO.	DATE
97-18	438-687	1406	35/109	8/20/52
			NO. PCS.	OPER'S NO.
NO. PCS. RUN DAY SHIFT			80	020
NO. PCS. RUN 2ND SHIFT			—	—
NO. PCS. RUN 3RD SHIFT			—	—
FIXTURE MEAS. BEFORE GRIND			8.230	
FIXTURE MEAS. AFTER GRIND			8.010	
TOTAL GROUND OFF			.022	
SIGNED Ben Bedford				

HOB INSPECTOR and operator of gear hobber enter data on this tag, which goes with hob to shop and tool-grinding crib. Inspector marks on back of tag stock to be removed when sharpening the hob. This is checked with gage readings recorded on face of tag

necessary to remove to sharpen the hobs properly, while the left-hand portion reflects the tendency of the grinder operators to remove enough stock from *all* hobs to sharpen the dullest teeth. Next phase of this hob control program will be to determine the cause of the variation and to establish controls.

When a new hob is received, a serial number is electric-etched on one end, and the base tooth-height reading is recorded on a master hob record card. The serial number of the hob and the base tooth-height reading also are marked on an operation tag which is attached to the hob and accompanies it to the shop when issued for cutting.

Operator of the gear hobber enters on the hob tag the part number of the gear being cut, the machine number of the hobbing machine, the number of gears cut before the hob is returned for sharpening, and his time clock number. The tag is returned to the gear laboratory with its hob.

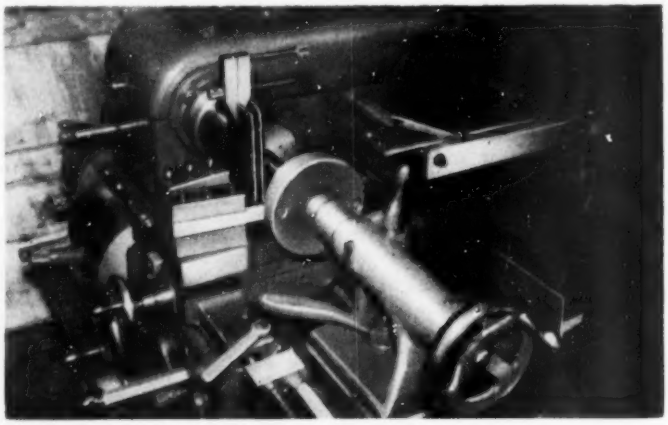
When the worn hob is inspected, wear or amount to be removed in sharpening is marked on the hob tag. After this hob has been sharpened it is delivered to the tool inspector, and the amount actually removed is recorded on the tag. A new tag is then attached to the hob, and the old tag is sent to a record clerk so data can be transferred to the master hob record card. Sampling studies of data on the hob record cards are made from time to time to check the efficiency of the hobbers and hob sharpeners.

1000 FPM SURFACE SPEED PRODUCES MIRROR FINISH

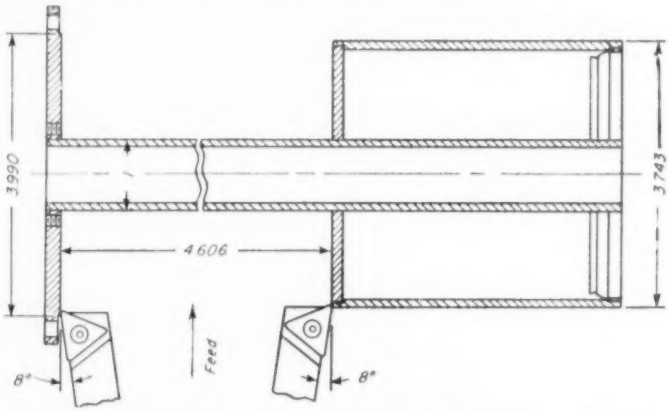
SAE C-1118 steel is turned at 1000 sfpm to attain a mirror-like surface on two faces of a hf transmitter component at McElroy Mfg Corp, Littleton, Mass. High finish is desirable because the piece later receives a plate of 0.0002 in. of copper, topped by 0.0012 in. of silver. The surface is then buffed and rhodium-flashed to prevent tarnish.

Parts are double-faced in a ¾-hp Logan lathe with variable-speed-drive attachment. This makes it possible to maintain surface speed constant from a 4-in. down to a 1-in. diameter, essential if finish quality is to be maintained. Rotative speeds range from 1000 to 4000 rpm. The toolslide, which actuates speed change also, is fed in at 0.0045 ipr.

At lower surface speeds, satisfactory finish could not be obtained; at higher ones, tool life was too short. Originally, several grades of carbide triangular inserts of Kendex tools gave only 20 pieces per edge, or 60 per bit. Ultimately, the highly abrasion-resistant grade K8 was tried, to raise output to 60 pieces per face. Also, because depth of cut is only 0.007 in., the right- and left-hand inserts can be interchanged, thus doubling output, or producing 360 pieces per insert.



100 sfpm is maintained in this lathe setup for high-finish facing by varying rotative speed from 1000 to 4000 rpm as diameter is reduced from 4 to 1 in. The chip guard prevents chips from kicking back to scratch faces

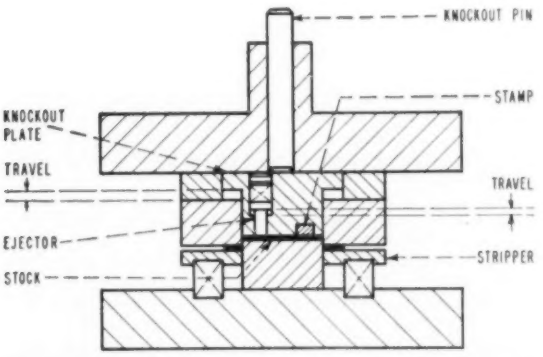


Two faces of a hf transmitter component are faced simultaneously at high speed with Kendex triangular insert tools or K8 toolbits. 60 pieces are machined per "corner", and bits are interchanged between tools, to give 360 pieces per bit. Bits are not reground

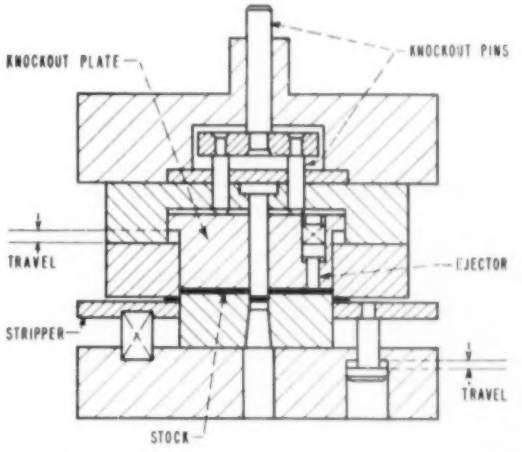
how to apply STRIPPERS PRESSURE PADS KNOCKOUTS to compound and draw dies

Successful operation of compound and draw dies depends on how well the die designer understands how to incorporate work-holding and ejecting devices, and also on his skill in balancing spring pressures. Nine sketches of dies that have worked satisfactorily are used to illustrate the principles involved

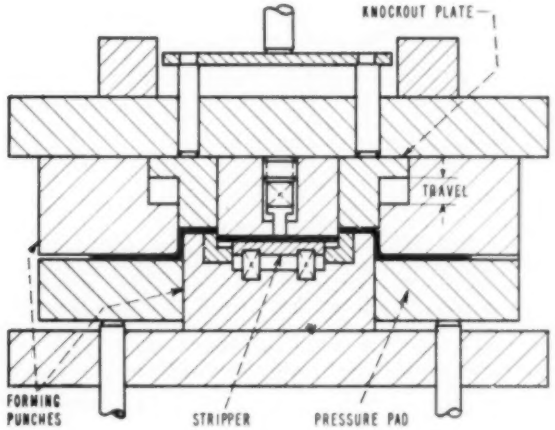
BY PETER BALSELLS, Tool Engineer



ONE KNOCKOUT PIN will probably suffice to eject a small piece from a compound die. If the piece is to be stamped or flattened in the same operation, the knockout plate should be designed so that it comes in contact with the punch-holder at the end of the downward stroke. A small spring-operated ejector operates within the knockout plate to push off the piece. A stripper frees the scrap from the punch. The distance marked "travel" indicates the length of mechanism travel

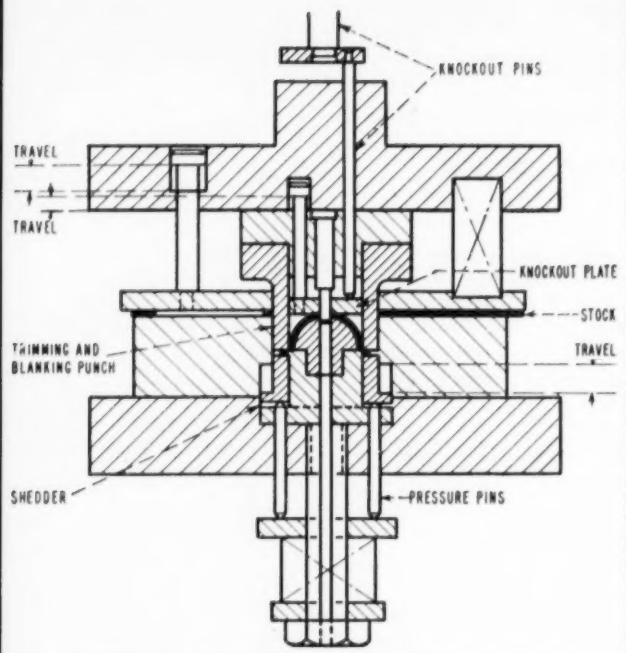


OPERATION of both compound dies is the same: The stock is placed in the proper position. When the ram descends, the upper punch comes in contact with the stock, and the latter is held beween the punch and stripper. With further ram descent, the stock is blanked. On the upward stroke, the stripper raises the stock to the normal level, while the small ejector prevents the piece from sticking to the knockout plate. Before the ram reaches top stroke, the knockout plate ejects the piece

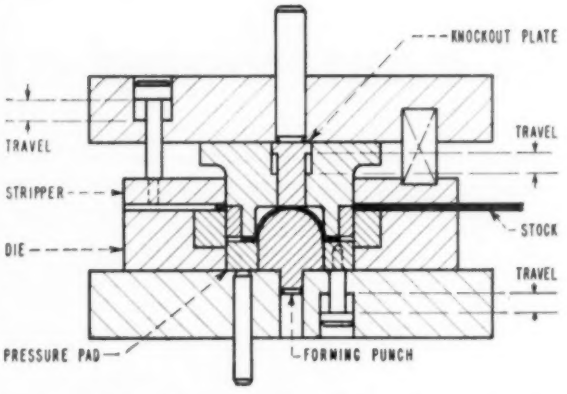


WHEN MAKING ROUND or rectangular parts with the center portion blanked out, a combination drawing and blanking die is used. Ejecting mechanism of this tool consists of a stripper, a knockout, a pressure pad, and a small spring-loaded ejector. In the upward motion of the press, the knockout ejects the piece from the die, the stripper ejects the inside part once it has been blanked, and the pressure pad holds the stock while it is being drawn. In large draw dies like this one, the forming punch is made of a good grade of cast iron, and hardened inserts are placed where any blanking or piercing operations are performed. In this case, the outer edge of the piece need not be perfectly flat. Therefore, the pressure pad is not designed to come into contact with the die shoe at bottom of the stroke.

In operation of the die, the inner punch blanks the hole near the end of the downstroke. On the upstroke, the pressure pad and stripper rise, carrying the piece and the scrap up. The ejector strips the blank from the punch, and the knockout plate forces out the piece

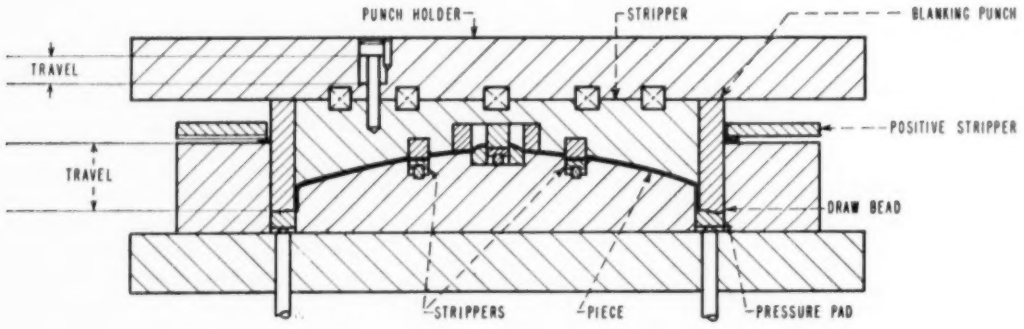


A COMPLETED CUP-SHAPED PIECE is made in this combination blanking, piercing and trimming draw die. Sometimes, a combination of operations like these is difficult to obtain, because of unbalanced spring pressures. In this die the blanking and trimming punch, together with the shedder, holds the stock while it is being drawn. Because of the sharp edge on the punch for trimming, the punch pinches the stock slightly at the end of the downstroke, making a small burr at the edge of the trimmed cup. Provision is not made in this die for ejecting the completed piece, in case it should remain nested in the punch. Usually the piece is nested in the upper portion of the die and is ejected by the knockout. Ejecting mechanisms consist of the stripper, a knockout and a spring-loaded pressure pad



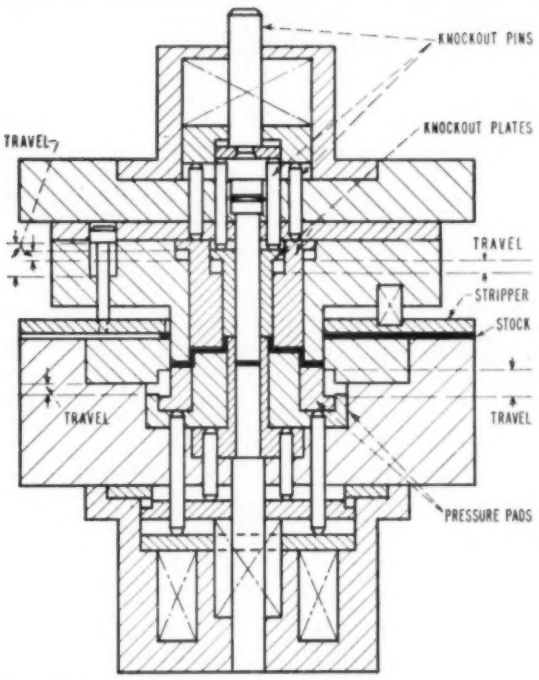
WHEN BLANKING, and then drawing a round cup with flat flange, it is necessary to use a pressure pad that will come into contact with the die shoe at the bottom of the stroke. The highest point of the lower forming punch should be at the same level as the stock, or if possible a stock thickness below that level. This consideration is necessary for proper blanking. Because of the small knockout plate, only one knockout pin can be employed.

Operation of the die is: With downstroke, the stripper contacts the stock and holds it firmly on the die block. The upper punch then blanks the piece, which is held firmly between the upper punch and the pressure pad during forming over the lower punch. In the upward motion, the pressure pad returns to its normal position, bringing the completed piece up to or even above the level of the stock. Before the ram ends its upward stroke, the knockout pin forces the piece from the forming die

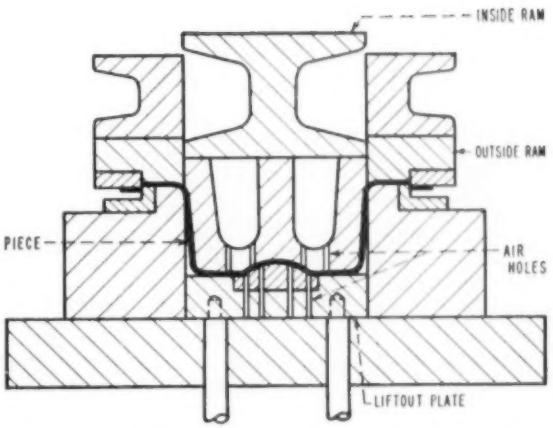


NO KNOCKOUT is used in this combination blanking, piercing and forming draw die for making a round piece. A heavy spring-operated stripper ejects the piece after it is formed. In order to obtain a uniform crown radius, the stripper is designed to contact the punch holder at the bottom of the stroke. Small spring-loaded strippers eject scrap after it is pieced. And a small combination die in the center of the main die pierces a hole and does a forming operation. Completed piece and scrap are removed manually.

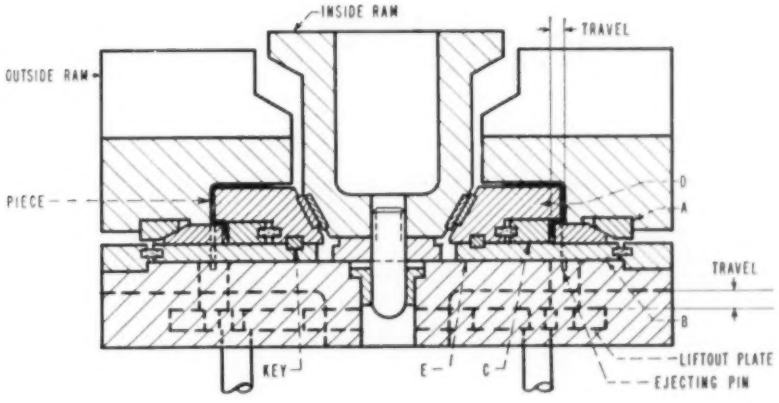
These ejection mechanisms are used: a positive stripper to prevent the stock from going up with the punch, a spring-loaded stripper to form and eject the piece; three small spring-loaded strippers to eject the scrap, and a pressure pad to hold the piece while it is being drawn and to eject the completed piece. The positive stripper holds the stock level, thereby preventing it from going up with the punch. Draw beads are necessary, because of the die size and small-holding area



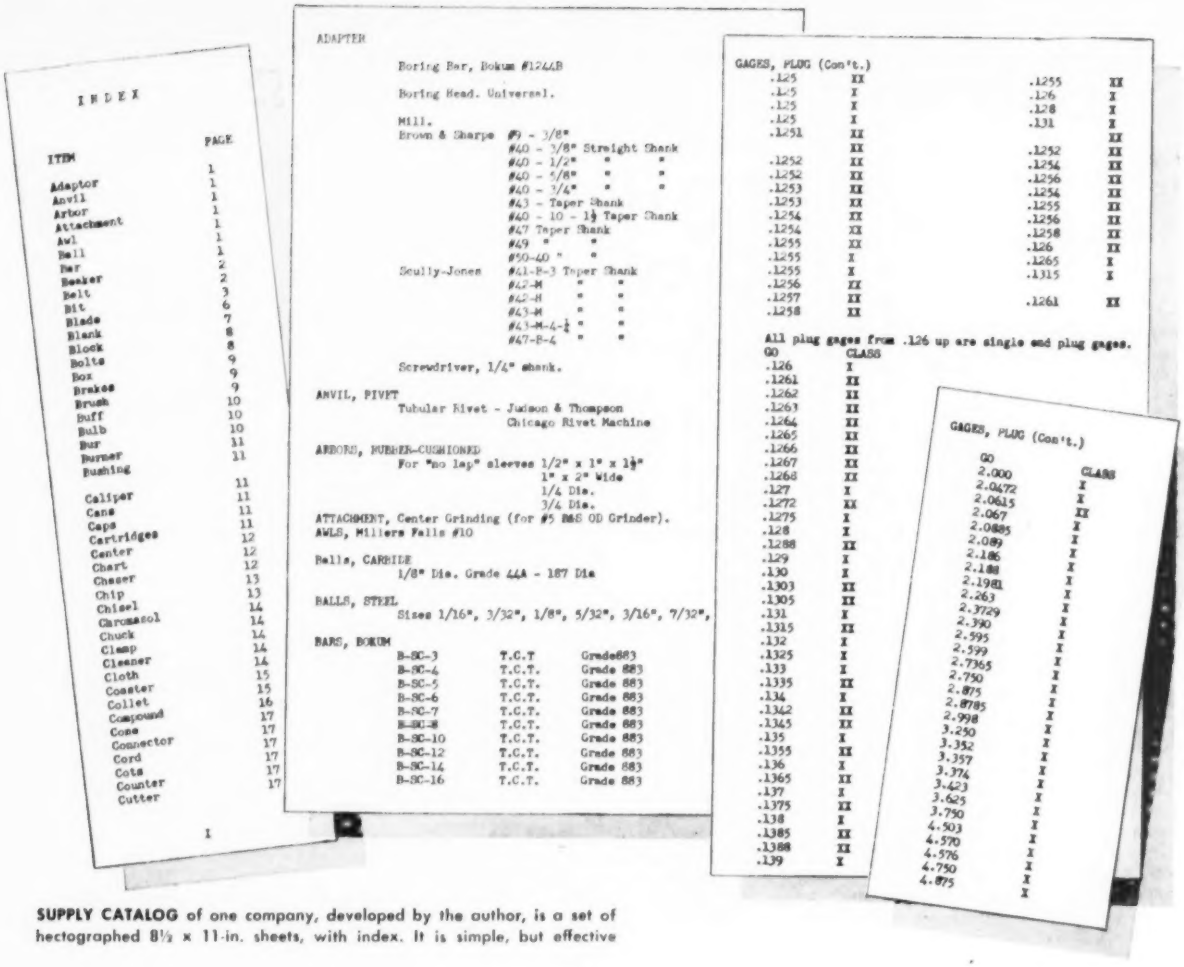
BALANCED SPRING PRESSURES are essential in a combination blanking, forming, extruding and piercing draw die for a small part. Too little spring pressure means that the piece will not be held properly between shedder and punch; too much pressure will interfere with proper flow of material. For a large part, pneumatic die cushions would be used to get a good draw. In order to obtain flat surfaces, one of the knockouts comes into contact with the plate attached to the punch holder, and the two shedders come into contact with the die shoe at the end of the stroke. The piece is ejected by the inner knockout, just before the ram nears top stroke



ONE LIFTOUT PLATE is the only ejection means required to eject a large round shell from the die used in a double-acting press. In this type of press, the outer ram is used to hold down the stock, while the inner ram descends to draw the material. The larger parts of the die are made of a good grade of cast iron to save expensive tool steel. Hardened tool-steel inserts are employed where wear occurs. Air holes are provided in the die to allow entrapped air to escape, and not interfere with the drawing operation. The die operates as follows: The outside ram moves down first to blank and hold the piece. Then the inner ram descends to draw and form the piece. After drawing is completed, the inner ram starts its upward motion, followed by the outer ram. The piece is ejected by the lift-out plate, which is actuated by pressure pins



CAMS DRAW AND FORM a cylindrical piece to the desired final shape. The stock is held by a pressure pad attached to the outside ram, and the cam-actuated block ***B***. When the inside ram comes down, the cam-actuated block ***D*** forms and draws the piece. On upward motion, the inside ram allows cam ***D*** to be returned to original position by springs pocketed in plate ***E***, which is keyed to ***D***. Insert ***A*** is attached to the outer ram and moves cam ***B***. Cam ***B*** moves horizontally, and its purpose is to hold the stock while it is being drawn. The punch mounted on the inside ram is guided into position for drawing by a pin and bushing. As soon as the outer ram has cleared the die, the ejecting pin, actuated by the liftout mechanism of the press, ejects the piece from the die. This is an example of a second-operation die used in a double-acting press for a final forming operation



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I

ADAPTER

Boring Bar, Bokum #1244B

Boring Head. Universal.

Mill.
Brown & Sharpe #9 - 3/8" Straight Shank
#40 - 1/2" " "
#40 - 5/8" " "
#40 - 3/4" " "
#43 - Taper Shank
#40 - 10 - 1½ Taper Shank
#47 Taper Shank
#49 " "
#50-40 " "
Scully-Jones #41-B-3 Taper Shank
#42-M " "
#42-H " "
#43-M " "
#43-M-4-½ " "
#47-B-4 " "

Screwdriver, 1/4" shank.

ANVIL, PIVIT
Tubular Rivet - Judson & Thompson
Chicago Rivet Machine

ARBORS, RUBBER-CUSHIONED
For "no lap" sleeves 1/2" x 1" x 1½"
1" x 2" Wide
1/4 Dia.
3/4 Dia.
ATTACHMENT, Center Grinding (for #5 B&S OD Grinder).
AWLS, Millers Falls #10

Balls, CARBIDE
1/8" Dia. Grade 44A - 187 Dia

BALLS, STEEL
Sizes 1/16", 3/32", 1/8", 5/32", 3/16", 7/32",

BARS, BOKUM

B-SC-3	T.C.T	Grade883
B-SC-4	T.C.T.	Grade 883
B-SC-5	T.C.T.	Grade 883
B-SC-6	T.C.T.	Grade 883
B-SC-7	T.C.T.	Grade 883
B-SC-8	T.C.T.	Grade 883
B-SC-10	T.C.T.	Grade 883
B-SC-12	T.C.T.	Grade 883
B-SC-14	T.C.T.	Grade 883
B-SC-16	T.C.T.	Grade 883

GAGES, PLUG (Con't.)

.125	XI	.1255	XI
.125	I	.126	I
.125	I	.128	I
.125	I	.131	I
.1251	XI		XI
	XI	.1252	XI
.1252	XI	.1254	XI
.1252	XI	.1256	XI
.1253	XI	.1254	XI
.1253	XI	.1255	XI
.1254	XI	.1256	XI
.1254	XI	.1258	XI
.1255	XI	.126	XI
.1255	I	.1265	I
.1255	I	.1315	I
.1256	XI		
.1257	XI	.1261	XI
.1258	XI		

All plug gages from .126 up are single end plug gages.

GO	CLASS
.126	I
.1261	XI
.1262	XI
.1263	XI
.1264	XI
.1265	XI
.1266	XI
.1267	XI
.1268	XI
.127	I
.1272	XI
.1275	I
.128	I
.1288	XI
.129	I
.130	I
.1303	XI
.1305	XI
.131	I
.1315	XI
.132	I
.1325	I
.133	I
.1335	XI
.134	I
.1342	XI
.1345	XI
.135	I
.1355	XI
.136	I
.1365	XI
.137	I
.1375	XI
.138	I
.1385	XI
.1388	XI
.139	I

GAGES, PLUG (Con't.)

GO	CLASS
2.000	I
2.0472	I
2.0615	I
2.067	XI
2.0885	I
2.089	I
2.186	I
2.188	I
2.1981	I
2.263	I
2.3729	I
2.390	I
2.595	I
2.599	I
2.7365	I
2.750	I
2.875	I
2.8785	I
2.998	I
3.250	I
3.352	I
3.357	I
3.374	I
3.423	I
3.625	I
3.750	I
4.503	I
4.570	I
4.576	I
4.750	I
4.875	I

SUPPLY CATALOG of one company, developed by the author, is a set of hectographed 8½ x 11-in. sheets, with index. It is simple, but effective

CATALOG YOUR INDUSTRIAL SUPPLIES

If your plant is larger than a job shop, you had better be interested in the money you can save by cataloging your own standard industrial supplies. Here's one way to do it that has worked . . .

BY HAROLD D RHODENBAUGH

In the purchase and stocking of industrial standard tooling and supplies, there is, or should be, a mean dimension with a plus tolerance; a margin beyond which a buyer would go only after having familiarized himself with the company's existing stocked items. In the most efficient industrial organizations, this is a difficult task. In less than a tight-knit organization it is an impossibility without a finger-tip system because of the time element involved, yet lagging delivery dates, critical shortage of certain tools and gages, plus increasing costs of these items, makes such familiarity essential.

For example, let us consider such a simple item as a screwdriver. There are many, many different sizes and shapes, and there are more different screwdriver manufacturers plus industrial supply houses listing these different makes and styles. It can safely be assumed that process engineers initiate purchase requisitions for the screwdrivers pertinent to your requirements. Most men initiating a

purchase requisition consult a catalog in making selections. Whose catalog do they consult first? Usually it is the one in the nearest file.

Should the parties concerned take the time to visit the central stores or tool cribs, they would be amazed and sometimes staggered by the vast quantities of unused items and tools placidly gathering dust year after year on the shelves.

There is a simple method of putting many of these idle tools and supplies to work; a method that will insure a company against negligent extravagance. *Catalog your own industrial supplies and standard tools.* In compiling your catalog, endeavor to make it as complete as possible, listing only catalog items and tools that have been standardized to your own particular requirements. If you have not standardized, by all means do so now. (See "Standardize Your Standard Tooling", *AM,* May 25 '53 p 126).

MAKE THE CATALOG WORK

Compile your catalog in alphabetical and numerical order. Control distribution of the catalog so that supplements can be added efficiently. Catalogs should be issued to only those who can use them as a tool in cost reduction: industrial engineers, process engineers, methods men, tool designers, draftsmen, etc.

The purpose of the catalog is to familiarize these people with tools and equipment readily available. Urge these people to consult your catalog religiously that they may utilize tooling and industrial supplies now in stock, rather than initiate purchase orders for items of which the equivalent may be in stock in quantity.

I compiled such a catalog and it is today in use at Lear, Incorporated, Grand Rapids, Mich, manufacturer of aircraft instruments, where production entails the use of many and varied types of items and tools. Among the many benefits derived from this catalog at Lear, it has become apparent that much time has been saved by eliminating the necessity of direct contact with crib or stores personnel before ordering a particular item.

Before introduction of the catalog, the width of grinding undercuts as ordered by Engineering was too diversified, and in many instances with a variation of only a few thousandths; for example: 0.035-0.040 wide undercut; 0.038-0.040; 0.044-0.048; 0.028-0.031, etc. To produce each size undercut we had to stock and maintain ten standardized tools. Now, with the catalog as reference, we can stock and maintain twenty undercut tools where formerly we would have required ninety within the same size range.

In compiling the catalog at Lear, we not only listed all standard tools as purchased, but also incorporated tool prints of all standard tools standardized to our particular requirements. In this way we made available to Processing complete knowledge of all standard and standardized tooling in detail, thus eliminating the expensive attitude of "Let George make the tool to do the job."

With a catalog at their fingertips, Processing Engineers need not release operations to Production hoping that standard tooling is available to run the job. Processing now knows it is, or is not, available, when the job is being processed; therefore is in a position to safeguard against bottlenecks from no tools after the job has been released for production.

Many small and medium-sized industries have experienced great difficulty in tooling for sizable Government contracts at tremendous cost to themselves because they could not present to engineers doing their work an accurate account of all tooling and industrial supplies available within their own stock.

A catalog is in no sense a perpetual inventory in that it shows no quantities in stock, but does indicate that these items are standard stocked items; therefore are assumed available or on order.

COST OF CATALOGING

Savings in plug-gage purchases and rework alone will pay for cataloging and maintenance of it. Consider how many combinations of plug sizes can be called out in increments of thousandths, in tenths of thousandths, within a one-inch range! Now consider the number of different-size holes (for manufacturing purposes only) which will be opened up later, that are established by your engineers. The company stocks or purchases these plugs and reamers to produce these holes. In many instances a catalog will make it possible for engineers to process to stocked sizes.

The economic advantages of cataloging are too numerous to mention here, but the possibilities cannot be ignored.

BILL- IT WOULD BE AN INSULT TO YOU TO GIVE YOU THIS NEW LATHE. ANY OPERATOR CAN DO GOOD WORK ON A NEW MACHINE- YOU'RE AN EXPERT AND THE ONLY MAN HERE WHO CAN DO QUALITY WORK ON YOUR MACHINE. YOU & YOUR LATHE HAVE GROWN UP TOGETHER.
THAT'S RIGHT- BILL & HIS LATHE HAVE ABOUT WORN OUT TOGETHER - ALSO.
"QUALITY CONTROL"

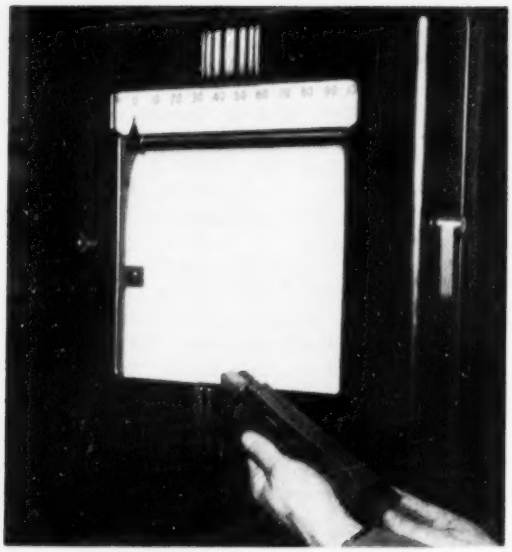


FIG. 1 . . **MEAN TEMPERATURE** of the chip-tool interface is recorded to ascertain the relationship between surface speed and tool wear. A copper lead brazed to the tip is connected to a modified temperature recorder adjacent to the test lathe

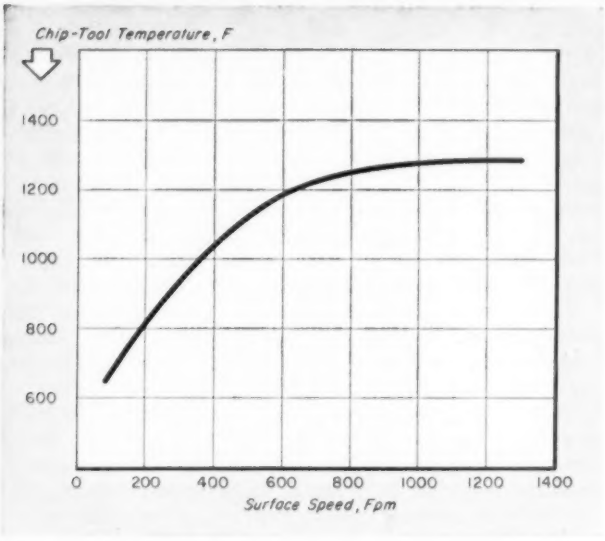


FIG. 2 . . **AT 1000 fpm,** temperature at the chip-tool interface tends to level off, but the cutting speed is limited to the ability of the tool material and coolant to carry off excessive heat. Material: AISI 8640; 0.010 ipr; 0.125 in. depth of cut

Practical approach to optimum machining...III

CHIP-TOOL TEMPERATURE AFFECTS THE

At high surface speeds, heat is concentrated within a smaller contact area between chip and tool.

Thermal failure of a cutting tool influences the selection of metal-removal rate. Carbide tools wear at a uniform rate when cutting steel under normal or convention cutting conditions. They show little failure from fracture or chipping. At higher surface speeds, the chip-tool temperatures increases, and the abrasion resistance of the carbide is reduced. Excessive wear also arises from cratering of the tool surface. Frequently, the gain in removal rate from higher speeds is lost in downtime for tool changes.

HOW TO COMPARE DATA

Control of chip-tool temperatures is thus an important phase of high-velocity turning, if normal tool life is to be realized. One word of caution is needed in connection with tool life and temperature studies. Data should be compared on the basis of cubic inches removed for a given "wearland" on the tool, and not on the basis of parts produced or tool life in hours.

Multiple and complex tooling has led to tool-life standards in terms of 6 to 8 hr. With the use of single-point tooling and indexing-type carbide tips, we can now accept 1-hr tool life as a reasonable standard. One hour of actual machining time often means 2 hr operating time, when handling and traverse time are included. But even this tool life is difficult to obtain at surface speeds above 1000 fpm. At this speed, the cutting condition is not balanced to give a minimum chip-tool temperature. Control of chip-tool temperatures is then an important phase of high-velocity turning.

In a machining operation, practically all the energy used to overcome chip friction and cause plastic flow is converted into heat. This is the major source of tool failure. Most of the heat generated by primary shear is carried off by the chip. A portion of the heat is conducted into the tool and contributes to the recorded chip-tool temperature. In contrast, little heat generated by frictional heat leaves the tool surface by way of the chip. Most of frictional heat is developed by a ploughing and welding action and remains at the tool interface. Frictional heat increases with higher surface speeds, and is largely responsible for the higher chip-tool temperatures obtained with increased speed.

An easy approach to all heat problems would be to reduce the energy required to form the chip. Actually this is more difficult to accomplish in practice than the machining theory leads us to believe. At lower surface speeds it is

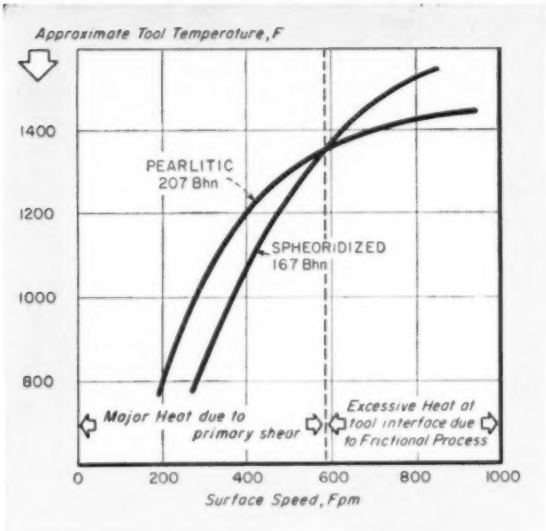


FIG. 3 . . PEARLITIC STRUCTURES in work material give longer tool life at high cutting speeds, because they produce less frictional heat at the chip-tool interface

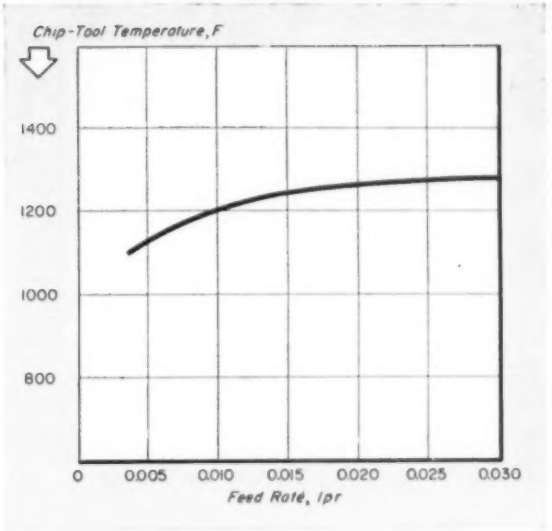


FIG. 4 . . BY INCREASING the feed rate, less secondary shear is produced, and the chip-tool temperature does not rise markedly. Material AISI 8640; 520 fpm; 0.125-in. depth of cut

CUTTING SPEED

BY A B ALBRECHT, Metallurgical Engineer, MONARCH MACHINE TOOL CO

Increasing the rate of metal removal by increasing the feed has less effect on the cutting temperature than increasing the speed

possible to improve a poor cutting condition by increasing the feed and speed, using a higher side rake angle, and changing the microstructure and hardness of the material. At higher surface speeds, the approach is limited, because there is no real reduction in the energy required to form the chip with increased speed. In addition, the heat is concentrated within a smaller area because of a reduction in the contact area between the chip and tool. Also, a higher amount of frictional heat is generated as the speed increases. The net result is short tool life.

TOOL-TEMPERATURE MEASUREMENT

The standard method of obtaining chip-tool temperatures is with a tool-work thermocouple connected to a highly sensitive galvanometer. Comparable results are obtained only when the system has been properly calibrated against a standard thermocouple. The chip-tool contact area serves as the hot-junction of a thermal electric circuit. Millivolt readings obtained represent a given cutting temperature. Calorimeter studies are also adaptable to heat studies. However, our experience indicates that a much closer control of the cutting condition is required to obtain reliable results than is needed when using a chip-tool thermocouple. Fig. 1 shows a K3H carbide tool which has a copper lead brazed to the back of the tip. The workpiece and tool are insulated from the lathe, and special carbide blanks are used to calibrate the system. The temperature obtained is the mean temperature of the chip-tool interface.

The relationship between surface speed and tool temperature is shown in Fig. 2. This is typical of all speed - temperature curves. Steady increase in tool temperatures occurs with speed, but there is a tendency to level off at higher speeds. This point is near the transformation temperature of the steel. At higher speeds, less heat is conducted into the work and a higher percentage is carried off by the chips. However, a thinner chip is produced, likewise smaller contact area, at high chip velocities. Cutting speeds are therefore restricted to the ability of the tool and coolant to remove excessive heat from the chip-tool interface. Under extreme temperatures and heavy feeds, tool wear is greatly accelerated by a welding action between the chip and tool, and consequent cratering of the tool surface.

Temperature data given in Fig. 3 show the effect of the frictional process on tool temperatures.

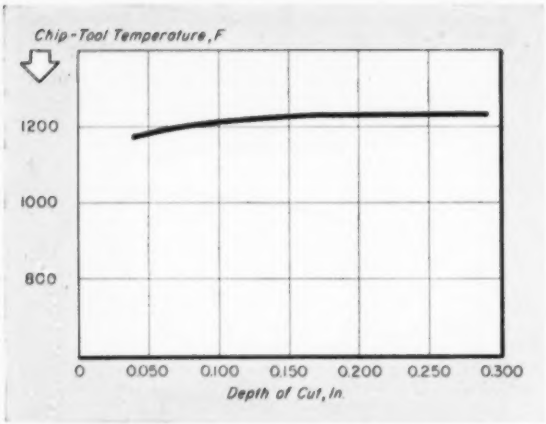


FIG. 5 . . DEPTH OF CUT has very little effect on chip-tool temperature, but is of course affected by stock on workpieces and finish considerations. Material: AISI 8640; 0.010 feed; 520 fpm

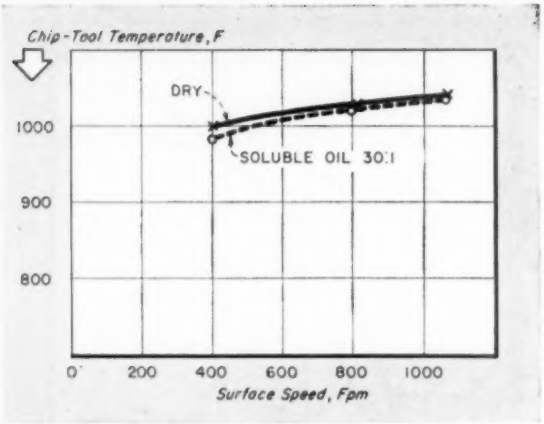


FIG. 6 . . COOLANT has little effect upon reducing the chip-tool temperature at speeds above 400 fpm

Above 600 rpm, the spheroidized bar produced a higher cutting temperature than that obtained for the pearlitic structure. Force measurements disclosed low unit shear stress required for the spheroidized steel. Thus, the additional heat produced in the cutting process had to come from secondary slip at the tool interface. Calorimeter studies made to determine heat in the chips showed little change in chip temperatures at higher cutting speeds. Therefore, we may assume that close to 90% of the heat generated by internal shear was carried off by the chips, and that any increase in chip-tool temperatures at high surface speeds is from the frictional process.

In practice, normalized and annealed pearlitic structures give longer tool life above 700 sfpm than do spheroidized steels. This observation supports the above conclusions regarding the importance of the frictional process at higher surface speeds, and especially greater sensitivity of spheroidized steels to secondary slip.

LESS CHANGE WITH FEED

The effect of variable feed on tool temperatures is shown in Fig. 4. The cutting temperature exhibits less change with feed than observed in the speed-temperature curves. Heavy feeds produce thicker chips. These have a higher heat capacity and a lower unit shear stress. The chips have a larger area of contact with the tool, which improves the nature of the heat distribution. They also show less sensitivity to secondary slip at the tool interface. Increasing the removal rate by increasing the feed rate has less effect on the cutting temperature than does increasing the removal rate through higher surface speeds.

Variations in depth of cut produce little change in chip-tool temperatures. Fig. 5 shows cutting temperatures for a number of depths of cut. From the curve, it is evident that efficiency of the machining operation, from the standpoint of removal rates, can be improved through increased depths of cut with less loss of tool life than by increasing the surface speed. The main limitation to this method is that in most production operations, the depth of cut is fairly well controlled by the stock left on the casting or forging and by the finish tolerances required.

It is well to remember that most cutting operations require a balance of all machining factors. Higher speeds and chip-tool temperatures are frequently endured in the interest of improved surface finish, dimensional accuracy, and shorter cycle time. In an effort to combat excessive heat generated during a high-speed operation, while maintaining normal or at least economical tool life, one must resort to indexing-type tools, proper use of cutting fluids, and improved tool-grinding methods.

Cutting fluids *should* perform two basic functions in a machining operation. Both of these functions tend to reduce the total heat present. They should be effective in removing excessive heat generated by the shear process and serve to reduce the friction between chip and tool. When friction is reduced, an improvement is gained in the shear energy required to remove the metal and lower chip-tool temperatures are obtained. An increase occurs in the shear plane angle and a decrease in the amount of chip deformation. Visual metal-cutting studies have shown that a cutting fluid can produce a change in the shear action at lower surface speeds if the coolant actually reaches the tool interface.

AT LOW SPEEDS

Nature of chip flow off the tool and the high compressive force produced by the cutting action make it difficult to visualize how a coolant can enter into the cutting edge. Present theories suggest that capillaries exist between the tool and chip due to surface roughness into which the fluid is drawn. This action is more likely to take place at low surface speeds than when operating at high surface speeds.

Actual reduction of friction is accomplished by introducing a low-shear compound into the chip interface. Cutting fluids that contain sulfonated and chlorinated compounds, fatty alcohols, and other reactive compounds will form a low-shear film at the chip-tool in-

FIG. 7 . . CRATER WEAR of 0.026 in. developed in top surface of tool adjacent to the cutting edge, because of the fusion and shear that takes place between the chip and tool at high cutting speeds

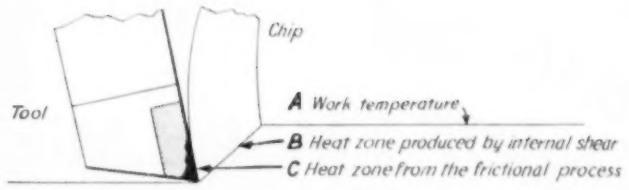


FIG. 8 . . SUMMATION of heat produced in three zones by the cutting process: At A—Work temperature—temperature of work surface decreases with increased speed and feed. At B—Chip temperature—in this heat zone produced by internal shear: (1) from 80 to 90% of total heat generated is removed by the chip; (2) no reduction in unit energy is obtained with higher surface speeds; and (3) as surface speeds are increased, the contact area between chip and tool is reduced, thereby concentrating the heat within a smaller area. At C—Tool Temperature—In the heat zone due to the frictional process, remember that: (1) The frictional heat is not carried off by the chip, but remains at the chip-tool interface; (2) the amount of heat increases with cutting speed, and (3) the heat from chip friction is the major cause of poor tool life at high speeds, as shown by calorimeter studies

terface, through chemical activity. Other coolants contain saponifiable materials which improve their lubricity and help reduce frictional heat. When turning at high surface speeds, the effectiveness of the lubrication properties of the cutting fluid is greatly reduced. This is clearly shown in Fig. 6. Note the tendency for the chip-tool temperature curves, when cutting dry and with a coolant, to approach each other at speeds above 600 fpm. Apparently there is a critical speed above which cutting fluids accomplish little in respect to reducing the chip-tool temperatures. However, there is some aid to tool-life by applying cutting fluids at the higher speeds, because of their ability to remove excessive heat in the work and tool.

LITTLE VARIATION

For a coolant to extract heat efficiently, it must have a high specific heat and high thermal conductivity. Water-soluble coolants are therefore used in preference to cutting oils having a mineral base. Our lathe tests indicate that water-soluble coolants do not vary much in performance, when applied to a turning operation at the higher speeds. Possibly a new approach is needed in controlling frictional heat.

One method of controlling friction is by selecting the proper grade of carbide for the cutting operation. The straight tungsten - carbide grades have a high resistance to abrasion and flank wear, but show a strong tendency towards cratering when used for turning steel. These grades, however, have high thermal conductivity, which allows for higher dissipation of the heat generated at the cutting edge. They are particularly adaptable to turning materials such as titanium having a low thermal conductivity, which limits the amount of heat carried off by the chip. They will also work well when turning tempered structures where a high amount of heat is generated by the primary shear and only a small amount of secondary shear is experienced from the chip flow.

The tendency for tungsten-carbide tools to weld to the chip has a definite effect on the nature of wear experienced during the machining. Welding action causes accelerated wear, because of the tendency for the chip to tear particles of the carbide from the tool surface as the points of contact are sheared loose. This surface wear is called cratering and is illustrated in Fig. 7. Fortunately, the tendency for fusion can be reduced by decreasing the cobalt content of the tool and by increasing the titanium content. For this reason, most of our high-speed machining is performed with a K5H tool.

These K5H tools, though less sensitive to cratering, are highly shock sensitive. Therefore, the rigidity of the cutting operation must be nearly perfect before normal tool life can be obtained. Chip breakers must be ground accurately to avoid overbreaking the chip and producing chatter. These tools have lower transverse rupture strength than other grades of carbide. Therefore, the depth of cut must be fairly uniform, so that the tool loads do not fluctuate to produce instability in cutting.

SULFUR AND LEAD

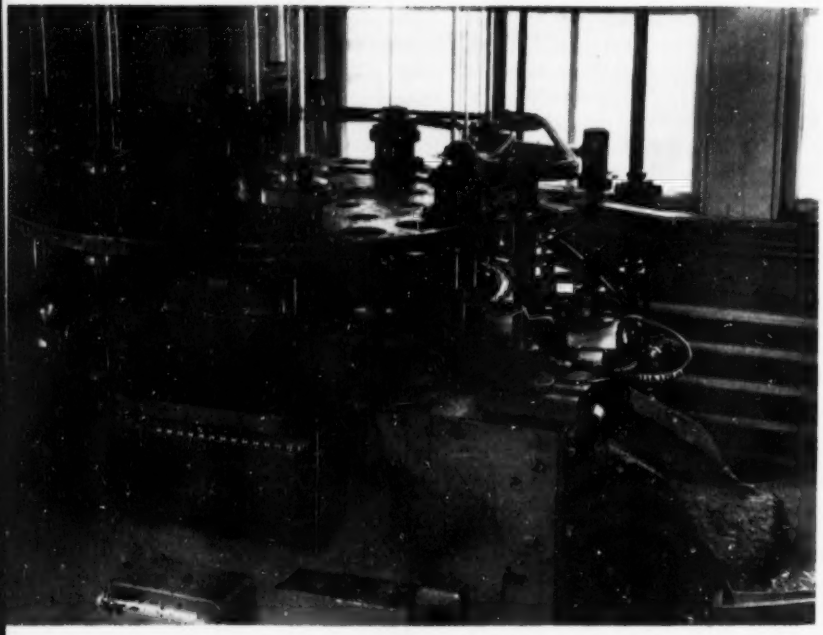
In addition to proper tool selection, microstructure is another important factor that influences the amount of frictional heat developed. We have already shown that the amount of secondary slip is affected by the amount of free ferrite in the chip metal, and that steels having a higher hardness and pearlitic structure will give longer tool life than soft ductile steels. Low-shear metals can be improved, however, through the addition of sulfur and lead. We recently obtained excellent results with a leaded 4145 steel, which was machined dry at 1200 fpm. A balance of good tooling, proper structure, and feed rate will reduce the frictional heat, permiting a profitable increase in cutting speed.

Part IV of "Practical Approach to Optimum Machining" will appear in an early number.

tools and talent Make Microwave Tubes

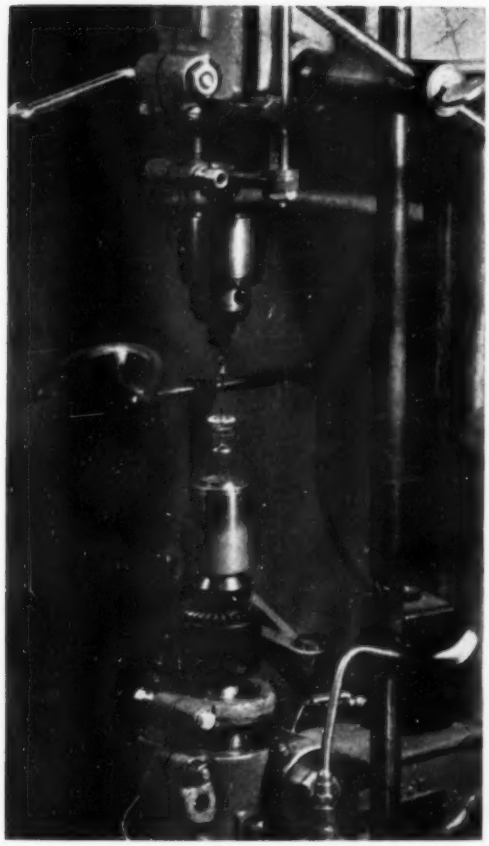
By WM M STOCKER, JR, Associate Editor

Two years ago, microwave tubes for electronic application were a pilot-plant product, made one at a time. Few people would believe that they could ever be manufactured with production tooling. Components are intricate and minute; tolerances are extremely close. Now, in an ex-warehouse in Salem, Mass., Sylvania Electric Products Inc has adapted standard tube machines to produce these complicated instruments in quantity

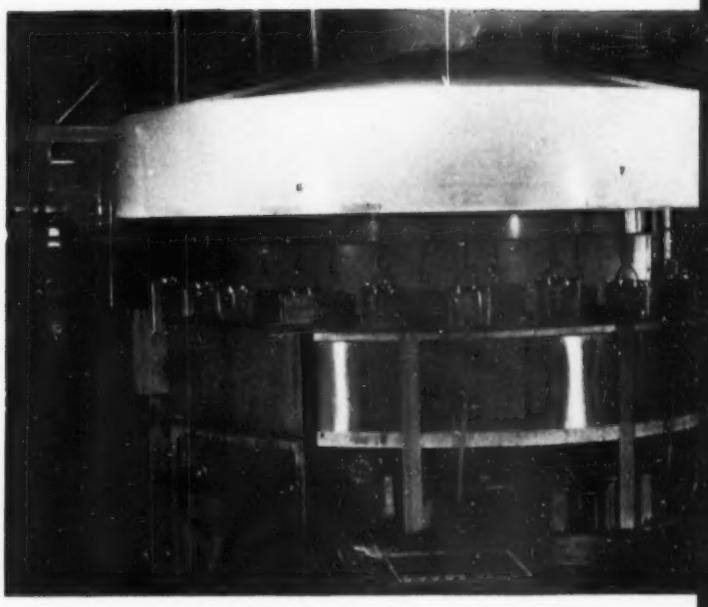


SHOCK CUTTER slices long glass tubes into properly sized pieces. Collet is cam raised to release tube, which drops to length stop. Then cam releases collet to clamp tube in position. Glass is heated by pin-point hydrogen-oxygen flames (right), then quickly chilled by water-cooled copper bar which also applies slight pressure. Result is a clean fracture to exact length and pieces roll down chute to tote pan. Doubleside V-belt rotates collet

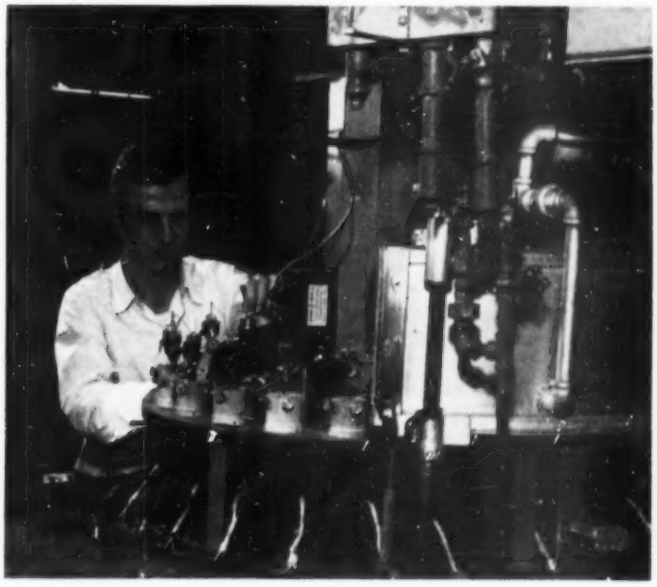
GRID ASSEMBLY utilizes a hydraulic press and precision to form the correct radius in the grid mesh. The mesh is laid on top of a soft copper grid frame and then the upper die is brought down to form the mesh and to press it into the soft copper to hold it in place until a brazing ring can be added to secure the mesh



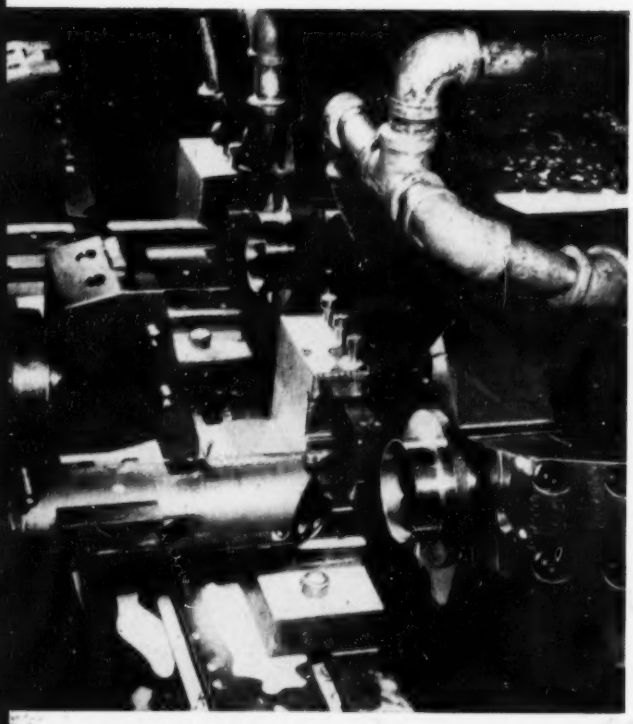
VERTICAL GLASS LATHE is used to make glass to glass seal on high-frequency vacuum tube. The parts to be sealed are positioned by bringing them together and then removing a given size shim. The seal is accomplished by preheating both parts with a gas-oxygen flame and then sealing with a pinpoint hydrogen-oxygen flame. This flame is used to provide a very high heat in a concentrated area and thereby gives the operator control over the quantity of glass used in making the seal



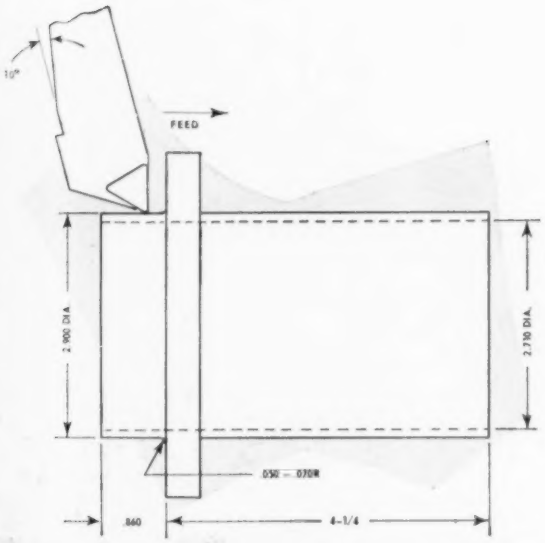
MERRY-GO-ROUND PARTS WASHER was developed, by one of the engineers, from an old rotary sealing machine. Using a Hoffman geneva drive with an electric motor for indexing and a hydraulic ram for lifting, the machine provides manual or automatic cleaning. An electric timer controls the cycle. Tanks of solution, or water, are placed in the trough and parts are carried in the stainless steel baskets. Cycle is determined by shortest time in any one bath; longer treatments are obtained with multiple tanks



ROTARY EXHAUST MACHINE, using a Geneva index system, normally indexes every 10 seconds. An automatic timer is used with the Geneva system to maintain the same crossover time provided with a 10 second index and to increase the dwell time. The crossover time must be short to hold the vacuum. The vacuum system consists of 4 megovacs, a vacuum plate, and a diffusion pump at each of the 24 positions. The electrical system is complex because this tube has 7 electrical connections



TRIANGULAR CARBIDE TOOLBIT INSERTS were used to replace brazed carbide toolbit on this Potter and Johnston No. 502 two-spindle automatic. Parts in process were forged steel cylinder barrels. With no other change in the operation, tool cost was cut to 1/13th of the original and downtime was markedly reduced



STANDARD KENNAMATIC TOOL, style TBR-16, was modified by milling one side of its shank to provide a 10° clearance angle. Thus it was possible to machine the flange shoulder square to the barrel

CHANGE A BIT, SAVE A LOT

Tool cost per piece was cut from 1.0 cent to 1/13 cent by simply changing the toolbit in a setup for turning forged cylinder barrels (AMS 6382) at the Fairchild Engine Division of Fairchild Engine and Airplane Corp, Farmingdale, NY. Performed on a Potter and Johnston No. 502 15 hp, two-spindle automatic, the operation consists of rough and finish turning with the tools set up in a knee attachment. By changing from conventional brazed carbide tools to Kennamatic triangular insert carbide tools, Fairchild saved both tool cost and considerable machine down-time. Tool-setting requires less effort than previously.

Now, two standard style TBR-16 tools are used. Grade K2S is used for roughing and grade K4H provides the finish cut. As the knee attachment positioned the tool at 25°, it was necessary to mill a 10° clearance angle along one side of the Kennamatic toolholder. This angle together with the 15° lead angle on the toolbit permitted machining a square shoulder.

The previously used brazed carbide tool, style BR-16, rough turned 20 pieces or finish turned 25 pieces per grind. Since the triangular inserts are in use, 100 pc per cutting edge are roughed and 140 pc per grind are finish turned. As three indexable cutting edges are available to the operator at each end of the toolbit insert, 600 pc are obtained per grind on roughing and 840 pc can be finished per grind.

Triangular tools are being operated at the same speeds and feeds as were used with the brazed tools. Feeds used are: Roughing—0.012 in., finishing—0.005 in. Depth of cut for roughing is 0.040 in. and 0.010 in. for finishing. At 108 rpm for roughing and 205 rpm for finishing, surface speed is 81 fpm for the former and 155 for finishng.

Total tool life of a brazed cutter is 400 to 500 pc and the tool cost per piece is approximately one cent. With the holder's cost prorated over the life of five toolbit inserts, which have a total life of approximately 7000 pc, tool cost per pc is only about 1/13 of a cent.

the 'STEAMER' is still with us

Wheeling a modern streamlined Class J passenger engine at Roanoke. Engine is lifted by two 150-ton cranes, controlled by one machinist, over trucks, wheels, and trailer correctly placed on pit track

A visit-in-pictures to the Roanoke (Va) shops of the Norfolk & Western Railway shows new methods and new machines in the major stronghold of the steam locomotive

Newspapers and magazines have made headlines these last several years reporting the end of steam-locomotive building in the United States, so it may be a shock to many to see these pictures and to realize that 60 "steamers" have been built since the "last one" was reported four years ago. What's more, the Roanoke (Va) Shops of the Norfolk and Western Railway are equipped with the latest type equipment.

Roanoke is a big shop as backshops go, where, with exception of the throat sheet, the boiler and entire locomotive are built. Single sheets are still hammered into special shapes over cast-iron forms with big whippy-handled black-gum mauls by a forging-hammer gang sledging in rhythm; yet there are new presses for production jobs, and welding has replaced riveting where it is better suited.

Progressive thinking with the steamer — rather than resignation to the diesel — is the rule at Roanoke. For example, it was found that traction could be improved on the big mallet locomotives by the addition of weight, so 14 tons of lead is being melted into the cast-steel bed frames. Again, auxiliary tenders supply locomotives with water to last as long as the coal they carry — a trick that cuts 45 min. off running time for the 112 miles from Portsmouth, Ohio, to Williamson, West Virginia.

Drop-forging connecting rods saves 750 lb of chips in machining them, and cuts costs noticeably. Reclaiming asbestos from boilers undergoing repair by regrinding it saves an equivalent investment in new asbestos of $3.50 per 100 lb. A new stores building and control system make every item of inventory readily available and visible, avoiding duplication and rush replacement orders.

These and other similar examples will serve to show that the "steamer" is still with us.

BY E J TANGERMAN,
EXECUTIVE EDITOR

American Machinist SPECIAL REPORT NO. 338 TO THE METALWORKING INDUSTRIES

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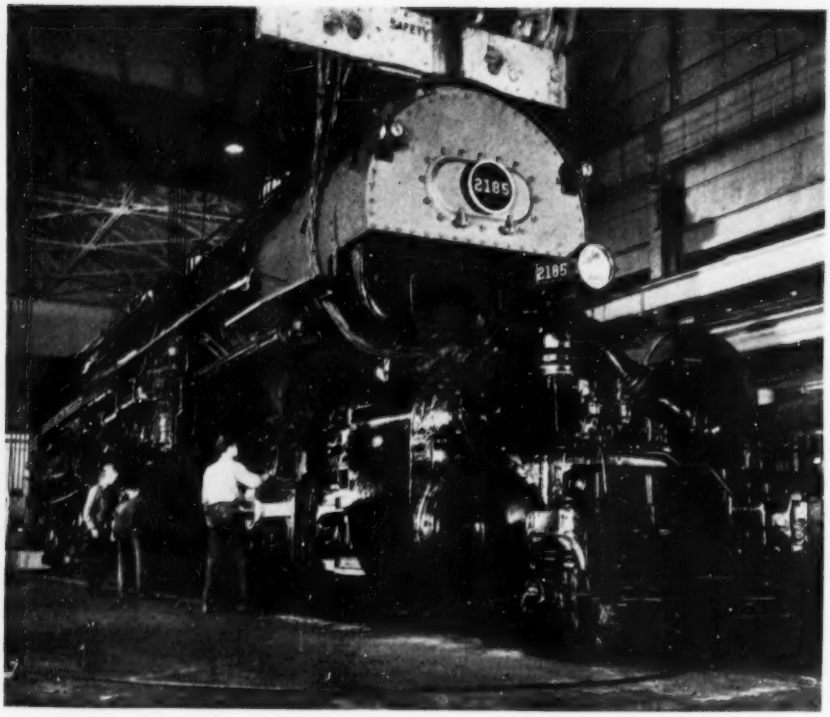
THIS IS WHAT



HIGH- AND LOW-PRESSURE ENGINES of a 2-8-8-2 Y6b heavy freight locomotive are coupled together, again with one machinist handling controls. There is only 1/32 in. clearance between the articulating pin and holes in the hinge casting, so the frame must be set exactly to permit the 7-in. articulating pin to be applied

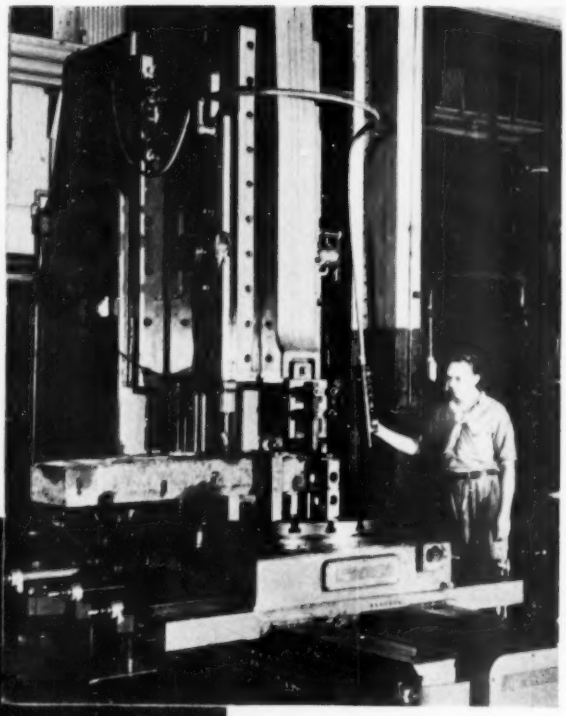
ONE END OF THE MACHINE SHOP shows typical backshop arrangement with high center aisle and two-floor side bays. At the far end, however, is a series of shallower balconies, to provide welder's and electrician's shops, as well as a shop-office floor above

THE ROANOKE SHOPS LOOK LIKE

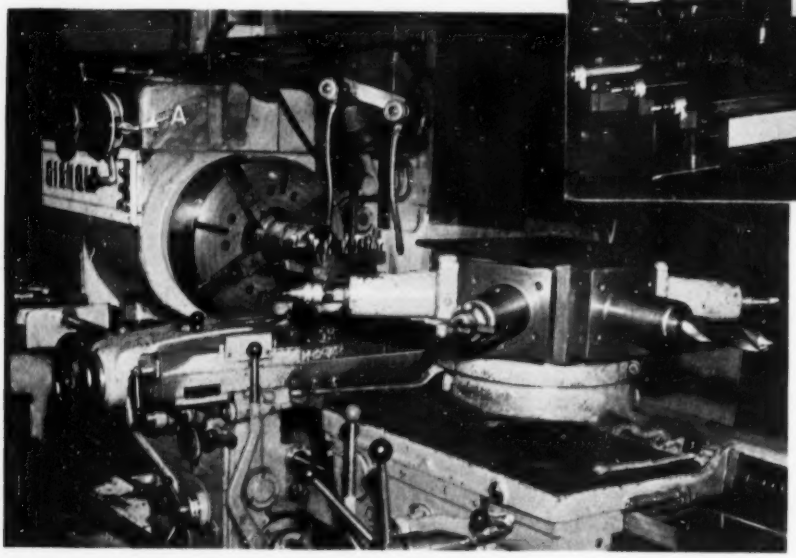
HERE, from the driving-wheel department at one end, is the view across the main bay to the pit tracks at far right. Wheel and axle machines are in the foreground, and beyond them on both aisles a group of boring mills

SMALLER MACHINES are on the balconies. Here is part of the tool department—on the right-hand side of the view down the main aisle

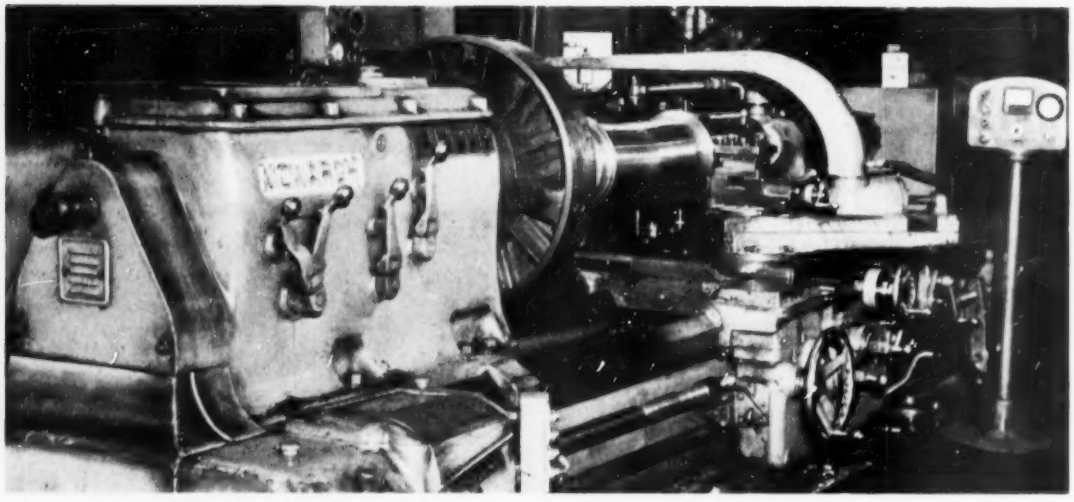
NEW MACHINE TOOLS ARE GOING IN



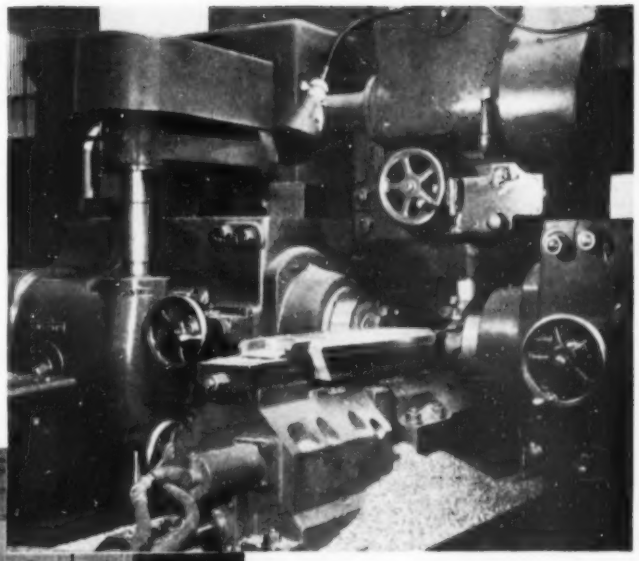
DRIVING BOXES and other large castings and forgings are machined on this 36-in. Rockford hydraulic slotter. Railroad shops have long been major users of the slotter because of the ease and accuracy with which frequent large contouring jobs can be done



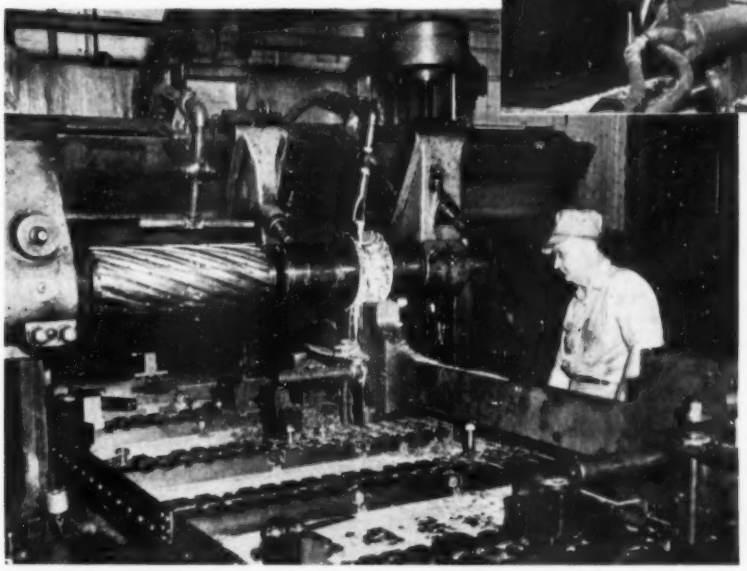
HEAVY-DUTY FORMING and turning on parts, such as crank and knuckle pins, is done on this new Gisholt turret lathe. It is equipped with automatic hydraulic gearshift and a pre-set mechanism whereby movement of lever **A** causes an automatic speed shift from a high speed such as is used in carbide turning or drilling to a slower one for a heavy forming operation



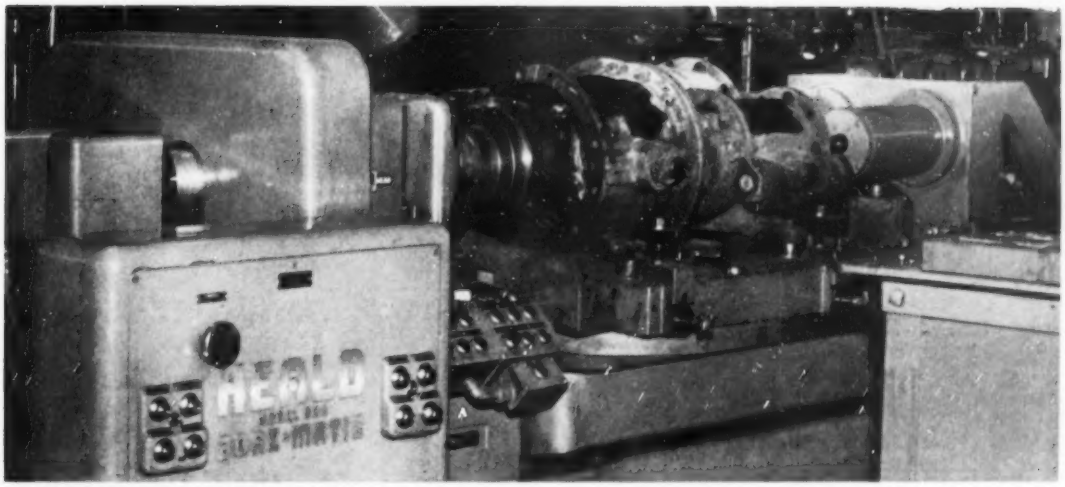
AXLES FOR LOCOMOTIVES or cars are contour-turned on this heavy-duty Monarch with tracing attachment. Usual practice is to trace a templet of ⅛-in. steel mounted above and behind the work



LOCOMOTIVE FRAME SHOES and crosshead shoes are production-milled in this special 3-way Cincinnati miller. With carbide cutters, this shoe was milled at a feed of 30 ipm. Shoes are now cast with a corner bevel to replace the former radius—that saves machining. The clamps are air operated

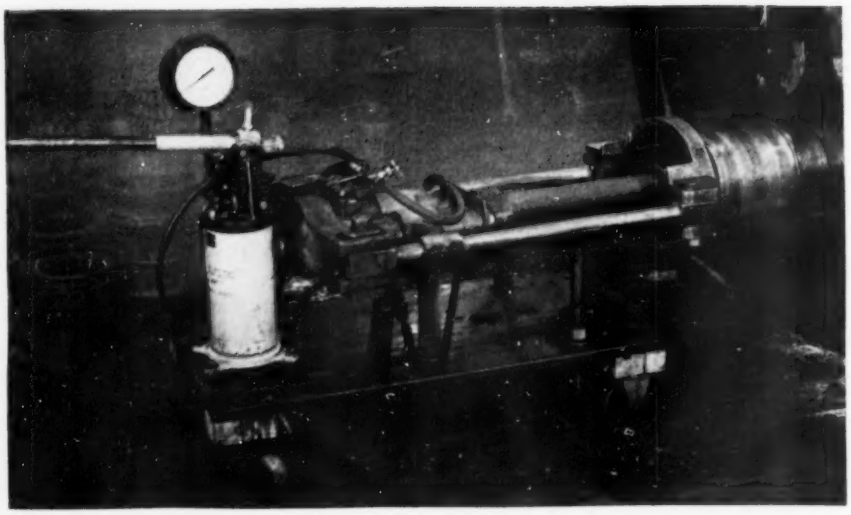


LOCOMOTIVE CONNECTING and parallel rods are machined on this special Ingersoll slab miller. Here the radius is being milled on the grease cup of a parallel rod

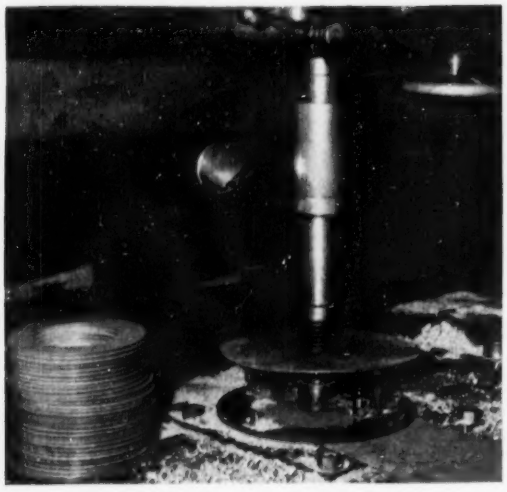


CROSS-COMPOUND AIR PUMPS (Westinghouse or NY Ajr Brake, 120 and 150 cfm) for steam locomotives are bored on a twin-head Heald Bore-matic. Operation is completely hydraulic, including chamfering. Carboloy-tipped tools operate at 400 sfpm. The machine is in the air-brake shop

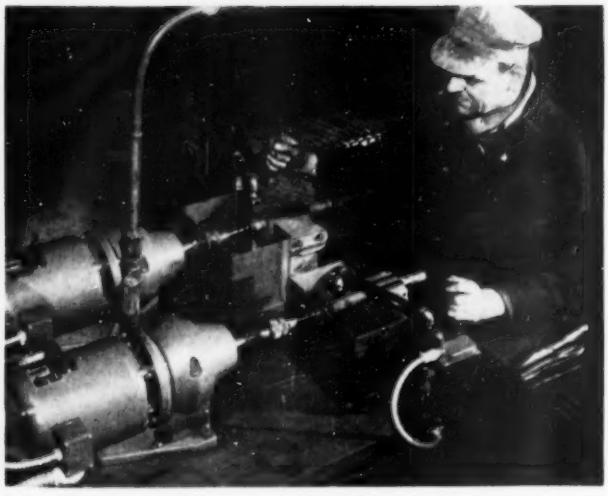
HERE ARE SOME SPECIAL SETUPS



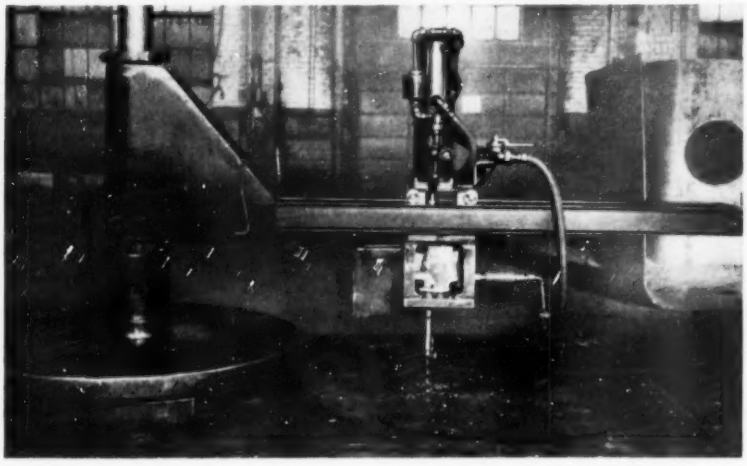
ROLLER BEARINGS are pulled from locomotive crank pins (to permit inspection) with this special fixture. It involves a hydraulic cylinder and a hand pump mounted on a truck



FIBER LINERS are cut from strip with this special trepanning setup. A coil spring around the spindle holds the ring clamp firmly on the strip while two cutting tools rotate inside the spider to produce the liner

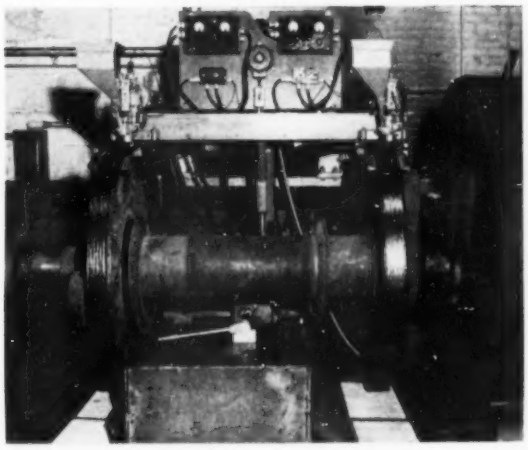


STAYBOLTS for all types of locomotive boilers are drilled in this special machine. Air vises hold the bolts while the high-speed drills are operating. Holes can be drilled up to 3 in. deep. Usual practice is to drill with one head and countersink with the other

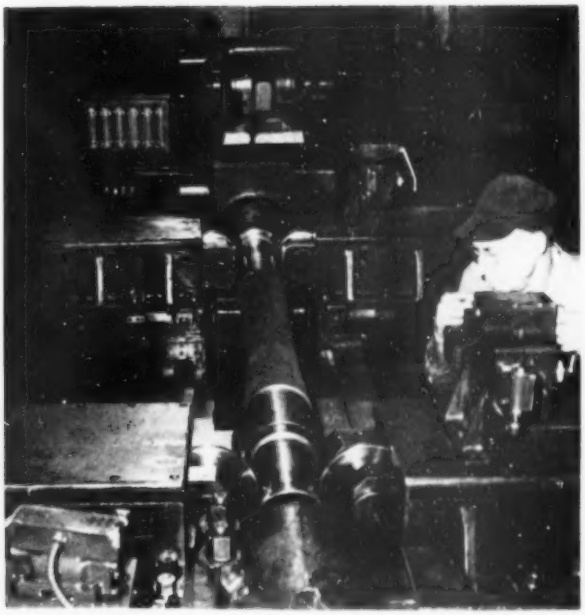


THIS PORTABLE RADIAL DRILL was made up of a reversible air motor and various shop odds and ends. It can be crane-lifted by a lug on the top of the column and set wherever desired right on any job—particularly on big boiler or flue sheets. It can drill holes up to 13/16 in. in diameter through five thicknesses of 5/16-in. steel sheet. The base plates for the column are 51 in. in diameter, one 5 in. thick, the other 3 in. The column is 5 in. in diameter, the arm a pair of 4-in. I-beams. The arm can be raised or lowered on the column, and is clamped where desired. The air-draulic cylinder over the motor provides feed. There's even a tank for drip-feeding of cutting fluid

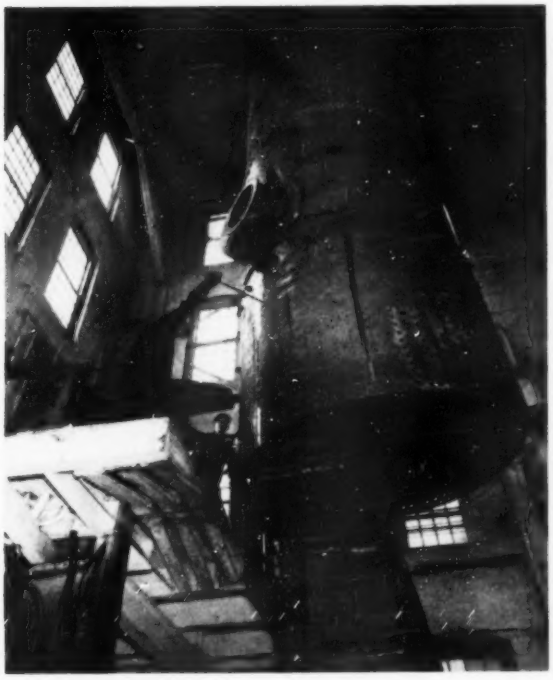
WELDING AND RIVETING ARE BOTH USED



DRIVING-WHEEL CENTERS are built up by welding, then re-machined to standard diameter. This special machine is really an old lathe geared to revolve at about 10 ipm rim speed. Two Union-melt heads, one over each wheel, build up the rims as the wheels are fed past

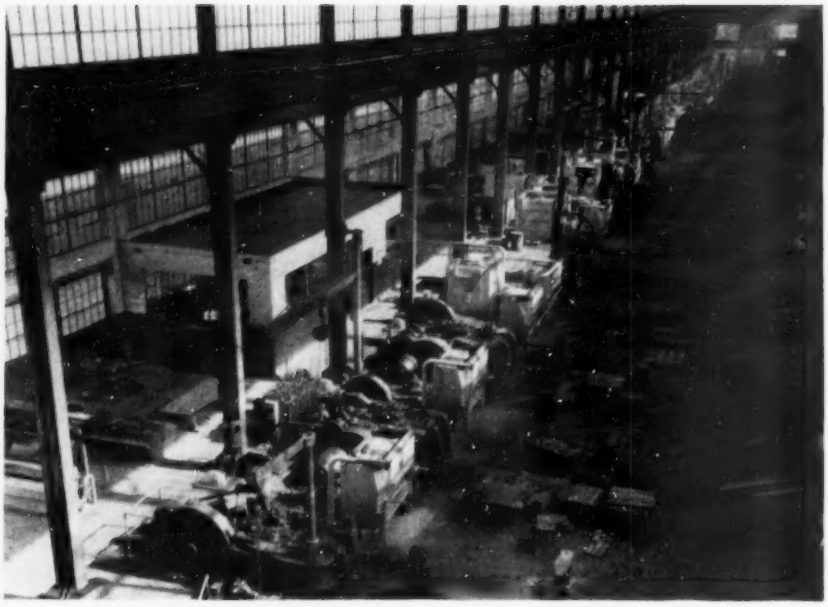


EACH JOURNAL OF AN AXLE is burnished after being machined by revolving it between two 8-in. Stellite-faced rollers. Individual levers control roller pressure and carriage movement. Axles are placed between the centers of this burnishing lathe by overhead crane, and driven by electric motor through a hydraulic unit which provides constant torque



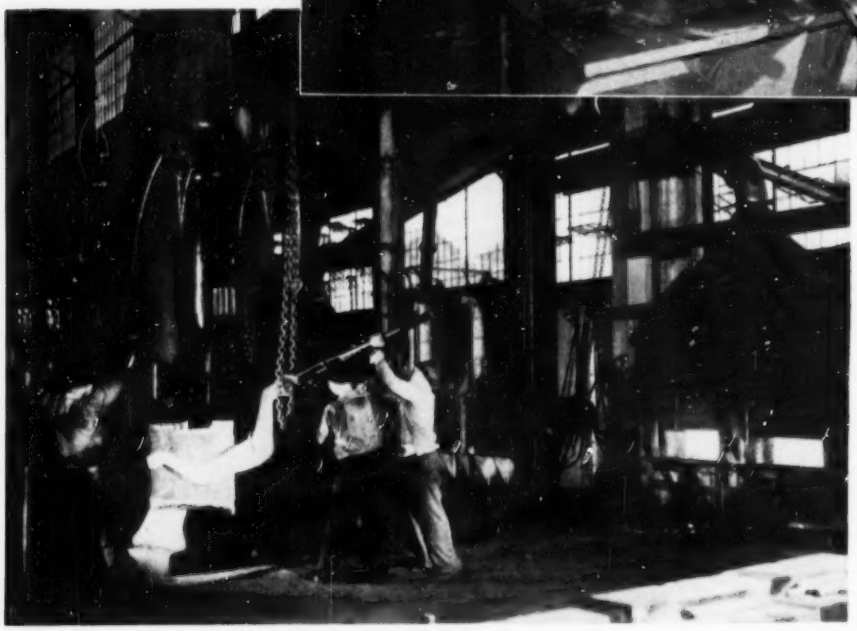
THIS BIG HYDRAULIC BULL RIVETER has a throat deep enough to take the biggest locomotive boiler. Here a Y6 boiler is suspended from the electric crane at the top of the rivet tower while four barrel courses of rivets are driven. A timing device on the main valve lever holds pressure on the rivet for 30 sec after it is driven, thus permitting some cooling and assuring a tight rivet. Other view of the bull riveter shows riveting on the first course. Controls for the 15-ton tower crane are at left, and beyond them the hydraulic controls, with the regulating valve up at left. Pressure up to 150 tons can be attained

HERE THE BLACKSMITH IS KING

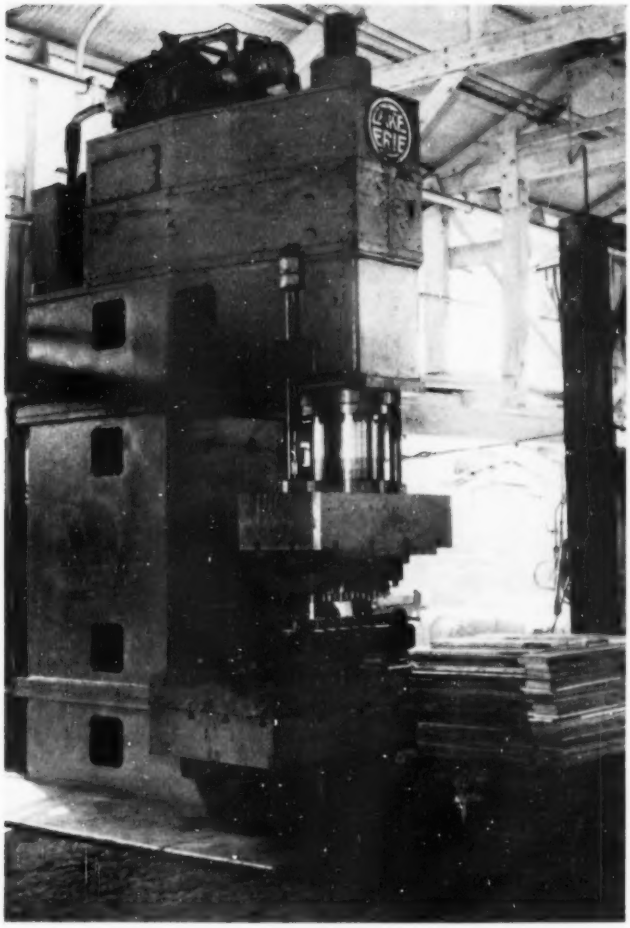


ALONGSIDE THE MACHINE SHOP is this blacksmith forging shop. Doors at left lead to car tracks, those at right to the Machine Shop. In the foreground are heavy forging machines, then drop hammers and heavy forging hammers

BUILT TO BEND freight-car coupler yokes (1¼x5¼x101 1/16 in.), this 25-ton "bulldozer" operates on 1500-psi hydraulic pressure from the accumulator behind the furnace. Oil-heated yokes from the furnace at center are clamped between center-pivoted arms, which then swing in around center form by action of twin arms from press yoke

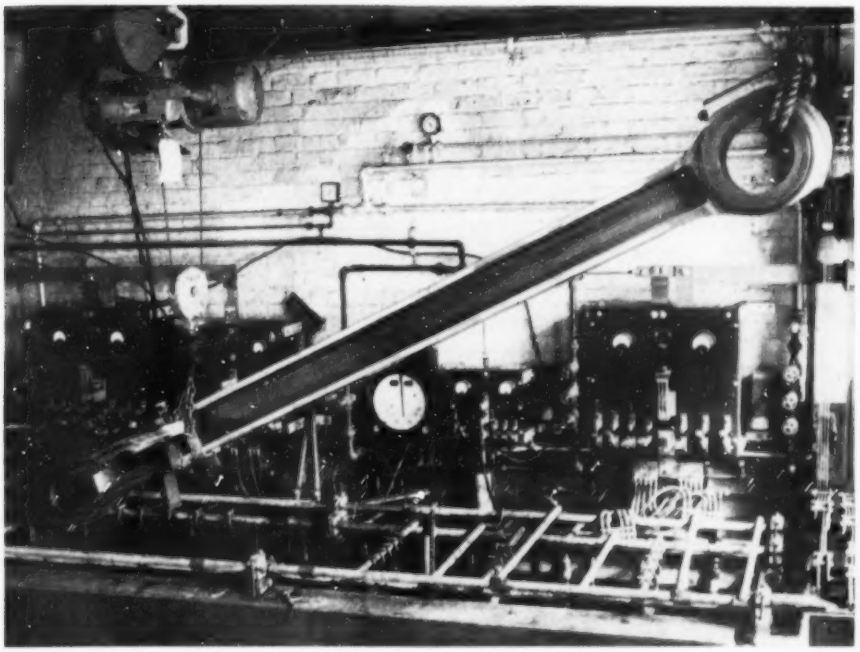


PASSENGER-CAR TRUCK EQUALIZER is being forged here by an 8,000-lb steam hammer. Special dies are used, and the equalizer, held by heavy tongs, is supported by overhead crane

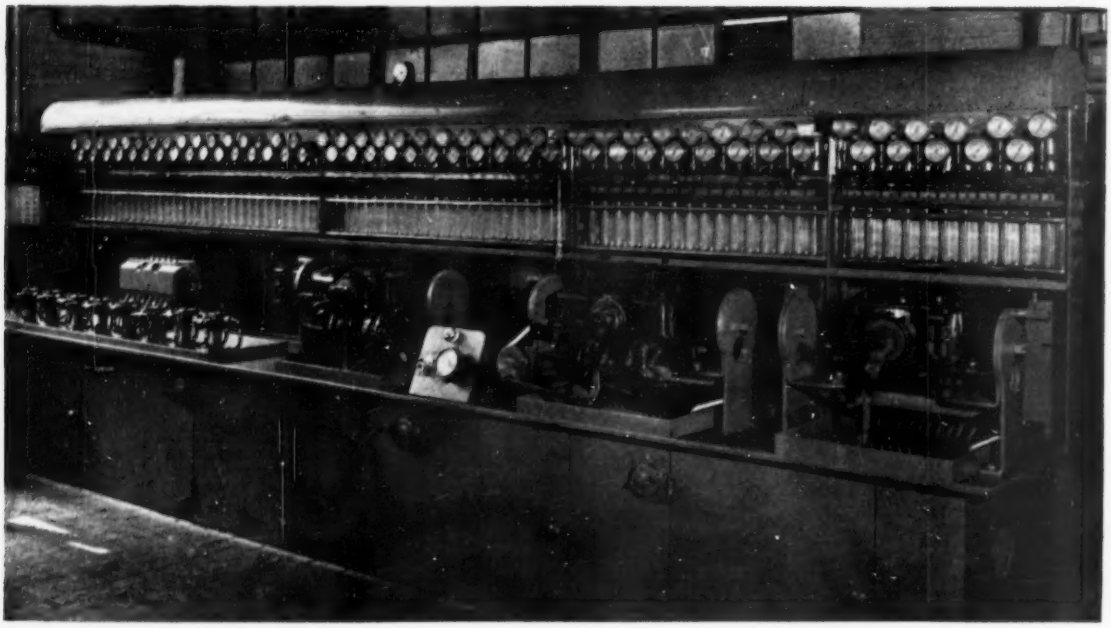


LOCOMOTIVES AND CARS, BUILDING AND REBUILDING, ARE DONE TOGETHER

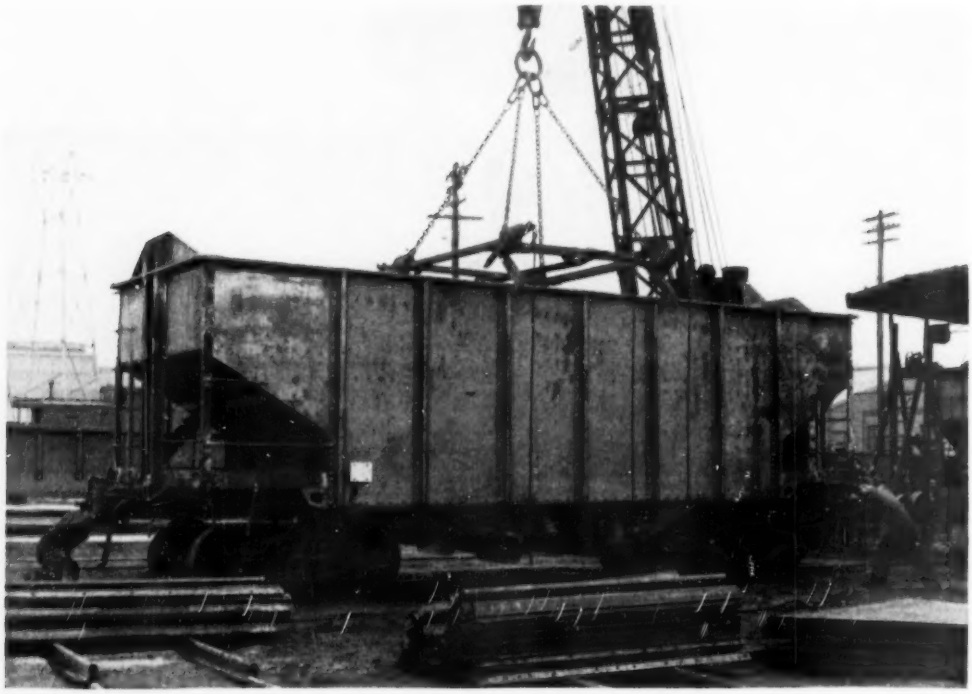
CONNECTION ANGLES for H2a hopper cars are formed from ⅜-in. flat plate. This die in a 250-ton Lake Erie hydraulic press makes a finished piece each stroke, the plate being multiple-punched at the front of the die block, and bent to V-shape at the back



HARD CHROME PLATING is done in this 2x3x12-ft-8-in. tank equipped with automatic controls. Temperature control is at the center, rheostats in the end boxes. The setup is fully automatic, so controls can be set and plating done to any required thickness. Here a locomotive main rod is being lowered into the tank



THOUGHT TO BE THE LARGEST lubricator test rack in the world, this rack in the air brake shop tests locomotive lubricators, air-pump lubricators, and 4-way oil distributors. It can simulate any road speed and condition



MANY FREIGHT CARS are made and repaired at Roanoke too. Here the body of an H2a hopper car is being placed on its trucks by a special ground-controlled rig on a locomotive crane. Cars are built up along tracks on special dollies for squareness, rather than on the spring-mounted trucks

ROUND TABLE

Safety Snoop

"What was all that commotion over in your department a while ago, Ed? You'd think somebody lost a hand, the way you were carrying on."

"That's just about what happened, Al. Jim Bardo took the guard off his press to try some kind of speed-up trick or other, and the usual happened. He'll lose a finger or two."

"Jim's an experienced man, Ed. How come he forgot about safety?"

"It doesn't take an inexperienced man to forget about safety, Al. Anybody can get foolish at times, and they often do."

"Seems like we should have a safety engineer around here. We could use someone who's got some foresight about accidents."

"Don't we have enough non-productive help as it is? I'll admit we need to watch out for accidents, but let's leave the overhead alone."

"No, really, Ed. I've thought for a long time we should have a safety engineer with authority to go into any department and specify changes as necessary. We need constructive safety thinking —and not tied down by department budgets and foremen's opinions. And we ought to have periodic inspections with a view toward special safety equipment. The only way to beat human failures is to keep at it, using all the experience and knowledge that's available."

"Nuts to that, Al. I've seen some of those safety guys working, and I don't like their methods. I'll take advice, sure, but I want to keep full authority. I don't want anyone putting useless guards on any special machine that's going to be used by an old hand for special jobs."

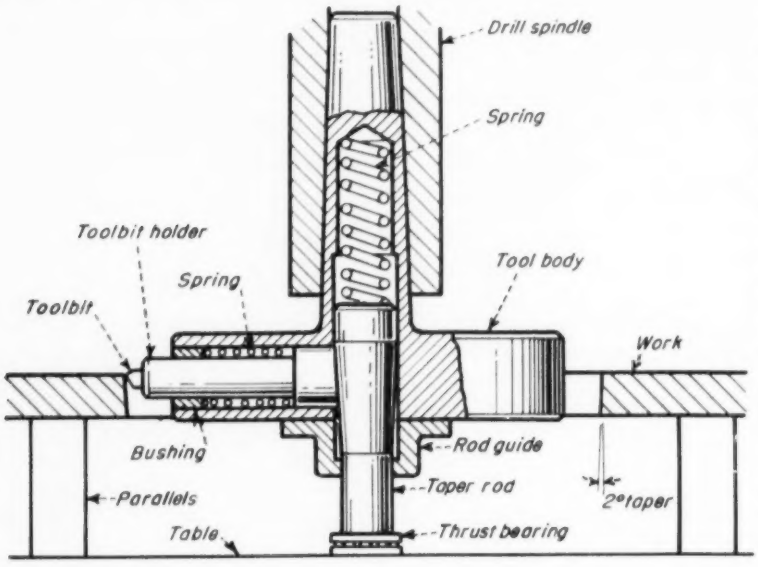
"It wouldn't mean taking away your authority, Ed. It would relieve you of some responsibility; but that's a good thing. You wouldn't have to worry about safety. And another thing; those special machines operated by old hands are just as much a safety hazard as production machines with regular guards in place—maybe more. Some good safety engineering could be applied there to eliminate just the sort of thing that happened to Bardo."

"Oh, I agree that there's a lot of danger around here that could be reduced or eliminated. In fact, I'm in favor of a general safety program. I think you have to keep the operator reminded of safety —that's the way to reduce accidents; not with a special snooping supervisor with too much authority for his own good."

"I think you're wrong, Ed. What we really need is someone to take up the whole problem—approach it intelligently and with full knowledge of what's involved. Safety's a big problem, and it needs a big budget."

***CAN** a safety engineer working on his specialty do more for a shop than a noisy safety campaign? How about Ed's suggestion that the best way to handle safety is to keep the operators reminded of it? Your opinions on this subject may help others with similar problems. Discussions of earlier topics appear on later pages.*

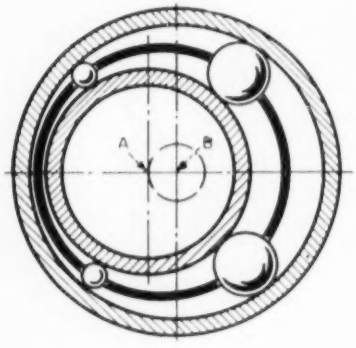
Practical Ideas



Taper-Boring Tool Guided By Internal Taper Shaft

To bore 6-in. dia in castings, and having only a jig borer, we used the method shown. After boring cylindrical holes, our first thought was to ream the taper. However, reaming requires a heavy machine with considerable power and the jig borer would not do the job. Thus, we designed the tool shown and bored the taper with a series of light cuts.

This tool is fixed, by a taper shank and a draw-in bolt, to the jig borer spindle. Inside the tool body is a hardened and ground feed rod with exactly the same taper as the taper to be produced. A heavy spring forces the rod against the thrust bearing. The toolbit holder is a sliding fit in the bushing and a second spring forces it against the taper feed rod. As the tool descends, the toolbit duplicates the taper of the rod on the internal surface of the work. A steel ball can be placed at the end of the toolholder. *A Wetsch, Steffisburg-Station, Switzerland*



Eccentric Ball Bearing Solves Multiple Motion Problem

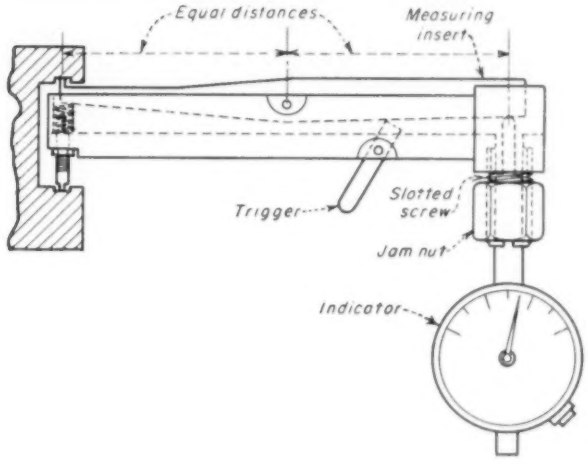
In constructing a highly precise machine-tool which required a spindle to rotate eccentrically to the centerline of, and within, another rotating spindle and also to move axially, we designed the special ball bearing shown. With only two precisely machined parts this bearing provides all of the desired motions. The trick is in using two different sizes of bearing balls. As the outer race is fixed, the inner spindle rotates on its own axis "A" and this axis rotates around axis "B" of the outer race, or sleeve. The inner spindle is simply a hardened tube which acts as a bearing race and as the tool carrier. To provide axial movement of the inner spindle there are four rows of bearing balls. The difference in diameter of these balls is not important because the cage speed of a ball bearing is always one-half of the inner race speed. To avoid any clearance in the assembly, the ball cage is split. One row of the larger balls is pressed into a wedge, created by the inner and outer raceway, by means of springs. If a slight variation in eccentricity is necessary, the cage can be further split, thus altering the distance between the small balls. *G Starre, Eindhoven, Holland*

Ed. Note: It is possible that as wear develops the small ball will grab and tend to jam between the races. To minimize the danger of jamming, the races frequently must be examined for wear and should be carefully lubricated. Also, it is very important to maintain zero clearance; thus avoid wedging.

Make Undersize Reamers Cut to Full Size

Place the undersize reamer in the hole to be reamed and select a number drill that will just enter one of the flutes of the reamer when the reamer is in the hole. Now select the next larger number drill size and replace the former drill in the flute with this one. Enter this drill and the reamer in the hole and ream as is normally done. If the hole must be still larger, select the next size drill and repeat the operation until the desired size is reached.

To produce a number of holes to the same size, mark the flute used with layout blue, as the flutes sometimes vary in depth. This technique has been successfully used for several years. *Wm Gardiner, Toronto, Ontario*

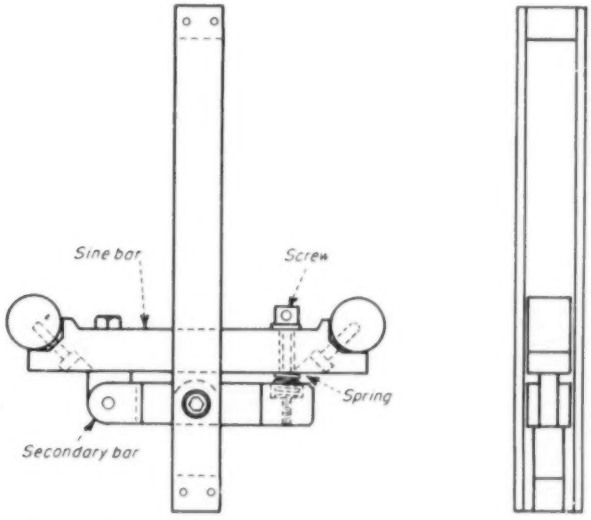


Dial Indicator Fixture Measures Internal Grooves

We had the problem of measuring a large number of various size grooves. The gage shown enabled us to solve this problem. In addition to measuring a groove to close tolerance, this gage is very versatile; it can be set to handle a variety of sizes by simply unscrewing the extension and replacing it with another piece made for the next job. This instrument has an added advantage of being light enough to be operated by one hand after it has been set at zero, thus leaves the other hand free to hold the piece being checked.

The gage is made by milling a piece of metal and drilling a through hole in one end, to act as a guide for the measuring insert and spring. The other end of the hole is tapped to hold the various extensions. The opposite end of the bar is tapped so that a slotted screw may be inserted. This screw and a jamnut are used to hold the dial indicator. A small hole for the measuring insert pivot should be drilled, thus allowing the indicator to show the exact size of the hole or this hole can also be located so that the dial indicator will read double or one-half of the actual error in the recess.

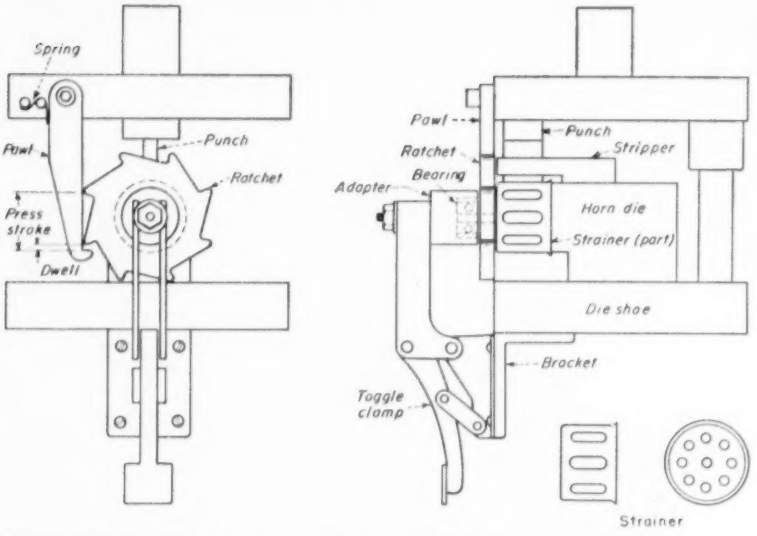
The gage is set for the proper diameter by using a micrometer, gage blocks, or any suitable measuring tool. With the dial indicator being properly set at zero for the required size, the operator can easily check the groove for size and roundness. To insert the gage into the recess, the trigger is pulled so that it depresses the tip of the measuring insert. Once inside the hole the trigger is released and the indicator is read. *F Harroy, Yorkshire, England*



Sine Bar Try-Square More Accurate, Versatile

The gage shown is, in effect, a sine bar mounted and pivoted on a secondary bar which, in turn, is pivoted between a pair of thin parallels. Thus it can be set square or at an angle. The sine bar can be reversed on the secondary bar so the gage can be used either way. A screw and spring provide fine adjustment and the parallels are thickened at their lower end to take a flush-fitting Allen-head clampscrew. This screw only clamps the secondary bar and this bar is narrowed through its center for the bolt.

This gage is particularly useful when it is inconvenient to swing the job through 90°. To check a vertical face, one, or both, parallels are located against the face and the sine bar is set to indicate level. When the gage is reversed, the bar should still indicate level if the face is square. Angles from the vertical are measured by setting the gage to the job, clamping the bar, and measuring with gage blocks or other suitable instruments. Vertical or angular hole location can be checked by locating against gage pins in the holes and aligning in the usual way. *R H Fry, Croydon, England*



Ratchet Fixture Speeds Stamping Circumferential Holes

Punching eight oblong holes around the circumference of a basket strainer was formerly performed by indexing two opposite drain holes to a spring loaded ball detent. The holes were then punched one at a time; required eight operations. Production was increased some six times by the following method:

A ratchet having eight teeth was sawed from a piece of ¼ in. thick plate. In developing the ratchet, a "dwell period" is included to allow for the entrance and removal of the punch. The distance of the "dwell period", deducted from the stroke of the press, determines the centers of the ratchet teeth. Two pins having diameters slightly smaller than the drain holes and spaced at the same centers were press fitted into the ratchet. These pins protruded approximately 0.020 past the face to engage the strainer and prevent slippage. A third pin was pressed into the center of the ratchet, with one end pointed to act as a needle bearing (the horn die has a center point to receive this) and the opposite end is pressed into the inner race of a small ball bearing which, in turn, is pressed into an adapter mounted to a toggle clamp.

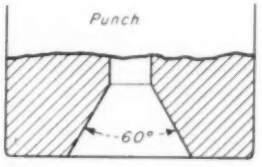
Enough friction is created by the pressure of the toggle clamp to eliminate any "backing up" of the ratchet. Should this fail, a counter ratchet and pawl would be necessary. The ratchet and pawl have thus far made over 100,000 "hits" and show no negligible wear even though they are made from crs and unhardened.

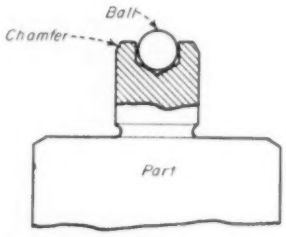
The operation as now performed is as follows: With the toggle clamp open, the part is placed on the horn die. The clamp is then closed with the two pins entering the drain holes. The pawl must be momentarily moved aside to clear the ratchet. The rachet is turned to the left until it is stopped by the pawl. The press, set to operate on repeat trip, is then continuously run for eight strokes, completing the operation. *Jim Watson, Los Angeles, Calif*

Improved Staking Punch

One of the items we manufacture requires a 1/16-in. dia hardened ball to be staked into a screw which has a ⅛-in. dia shaft ground on its end. To make the assembly function properly, the shaft had to be ground after staking. Grinding presented no problem but the balls became loose after grinding or dropped out entirely when we disassembled the apparatus after the first run. (Disassembly is done for checking.)

The problem resulted from the design of the staking punch which was in use at the time. The first punch was made the conventional way to leave a circular V-shaped groove in the piece, the theory being that the metal displaced by forming the "V" would crowd against the ball to hold it in place. This theory proved wrong because while some of the metal did conform around the ball, the rest of it simply made the outside diameter larger and this was ground off. We also had the problem of poor punch life.





We finally solved our problem by redesigning the punch so that it had a 60° female taper. Thus all the metal displaced by the staking operation is conformed against the ball. Since we have made this change, we have not had a single loose ball. Further benefits were realized by reduction of the distortion of the ⅛-in. dia at the end of the screw. We also eliminated the problem of poor punch life. To date only two punches have been used to make many thousands of assemblies. To improve production a dial unit can be used to feed the parts into the press. Thus work handling, loading, and unloading are speeded. *Lawrence H Austin, Butler, Pa*

How to Extend Bandsaw Blade Life

In general practice, bandsaw blades are discarded as soon as they have lost their original keenness. Unless they can be used at high speed for friction bandsawing, it has been impractical to salvage a worn blade. In an effort to prolong the useful life of an all-purpose blade, by dressing the worn teeth, a brief series of tests were conducted. The blade was removed from the machine, turned inside-out, and replaced on the pulleys with the teeth reversed. Then, with the saw running at a relatively high velocity, about 800 fpm, a section of broken 6-in. dia, 60 grit, aluminum oxide wheel was laid flat upon the saw table and held against the blade to grind off the rounded tips of the teeth. While the time required to dress a blade varies with factors such as wheel material, blade velocity, and pressure, this operation took about one minute.

To determine the practical value of this method, identical cuts were made and the time required for each cut was recorded. These cuts were all three inches long and were made in a piece of one inch thick cast iron. All cuts were made with DoAll Precision Bands (QDAR-K-G12) running at 125 fpm. At constant feed, 53 sec were required for a worn blade to make the three in. cut while a new blade made the same cut in 26.5 sec. After dressing, the worn blade made the identical cut in 32 sec. No lubricant was used in any of these tests.

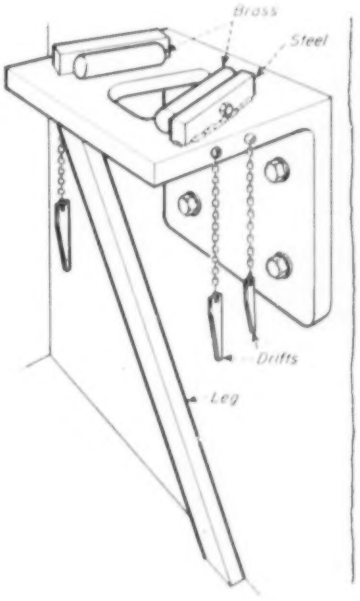
A slot 0.041 in. wide was cut by the new blade while the worn blade, both before and after dressing, cut a slot 0.031 in. wide. Hence, while the slot is narrower, dressing the blade does not appreciably affect the set of the teeth. The original set on this blade was 0.042 in. and the gage was 0.025 in. While repeated dressing of the blade eventually will diminish the tooth setting to a dimension which will make it increasingly difficult for the blade to pass through the cut, use of small diameter wheel section should make it possible to remove the rounded portion of the teeth without seriously affecting the set. The results of these tests indicate that additional blade life is possible by careful dressing. *A G Byers, Student, and R H Stolz, Instructor, Purdue University, Lafayette, Ind*

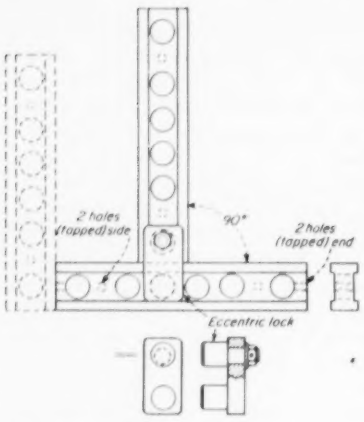
Taper-Shank Tools Removed On Convenient Wall Table

In most shops where milling machine or drillpress taper adapters and sleeves are used, it is common to find them and the tools such as taper shank drills, reamers, and boring heads in a battered condition. The damage is caused when tapers are separated with screwdrivers, chisels, hammers, or any other metal object within the machinist's reach. In addition to mechanical equipment replacement frequency, manufacturing costs are increased by reducing the tool accuracy. Tool checks are often demanded at the toolcrib window for items which still are firmly attached to their adapters. This causes constant irritation.

We solved the problem in our shop by building a simple mild steel table and attaching it, with an angle bracket, to a wall near the tool crib. The top surface of this table is only about 6 in. square and it is located about 29 in. above the floor.

One each of drifts No. 1, 2, 3, and 4 are conveniently suspended from the top surface on short lengths of chain and a lead hammer rests in a pair of ears welded to the supporting leg. Two brass rods about 1½-in. dia by 3 in. long are bolted to the table top. These rods are angularly located to each other at a 2 in. per ft taper and the wider opening at the outside. A hole is cut through the tabletop between these rods, to allow the small end of the drift to pass through. Steel bars can be welded to the table to back up the brass rods if they tend to spread during hammering. Most taper sleeves and adapters will lie solidly in this nest and are easily and cleanly separated. To avoid congestion at the tool crib window, especially in shops heavy with milling and drilling equipment, tables can be placed close to the machines as well. *L R Elliott, Oakland, Calif*





Multi-Purpose Parallels Simplify Work Layout

Parallels are frequently used in layout and setup and are sometimes clumsy to handle along with the other tools and instruments. The special parallels shown were designed to:

1. Use a temporary drill jig as the part can be butted against the square surface of a drillpress table or the ways of a lathe.

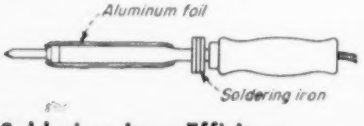
2. Clamp to a surface plate for height, alignment, and angle location in layout.

3. Provide tapped holes for fastening limit stops and similar furniture for drilling or milling duplicate parts.

4. Lock quickly in various arrangements by a slight turn on an eccentric locking pin.

5. Ultimately, use as plain parallels.

In addition to the large holes which are used for the eccentric lock or to hold drill bushings, smaller holes are drilled and tapped in the sides and ends. Then the parallels are hardened and ground. *Charles Capriccio, New York, NY*



Soldering Iron Efficiency Can Be Improved With Foil

The operating temperature of soldering irons (actually copper) depends upon the rate at which heat is absorbed by the work, (including solder and flux), the rate at which heat is radiated to the surroundings, and the rate at which heat is absorbed by the contacting air (convection). These three factors combine to equal the total heat supplied to the iron by electric power or stored in the soldering copper by flame heating.

When the electric iron is removed from contact with the work, heat is withdrawn from the iron at a slower rate. As the heat source, for an electric iron, is constant, removing the iron from the work eliminates the factor of heat absorption into the work and the heat accumulates in the iron. Conversely, when the iron is continuously used its operating temperature is kept low, sometimes too low for efficient soldering.

By wrapping one or two layers of aluminum foil around the heating element portion of the iron, leaving about ¼ in. of foil overhanging at each end to permit fold-over, heat loss by radiation will be greatly reduced. The operating temperature of the iron can be controlled by adjusting the area covered by foil. To observe the effectiveness of this trick, place your hand close to the heating element on a plain iron and then in the same position relative to an iron covered with aluminum foil. *G E Koslow, New York, NY*

Cotter Keys Can be Converted Into Good Laps

Faced with the problem of drilling and lapping a number of small holes in molybdenum rod, we did some head-scratching. Drilling the holes was not a serious consideration, but we were unable to find laps this small that would stand the necessary twisting. Then we hit upon the idea of convertng cotter pins to laps. We selected some straight and smooth pins, measured their diameter, and drilled a hole through the core of a ¼-in. dia crs rod. Then the pin was pressed into the rod, the head was cut off, and a cap was placed on the opposite end. *R J McKenzie, Minneapolis, Minn*

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April 13, 1953

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How to Improve Grinders

for the best PRACTICAL IDEA

An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

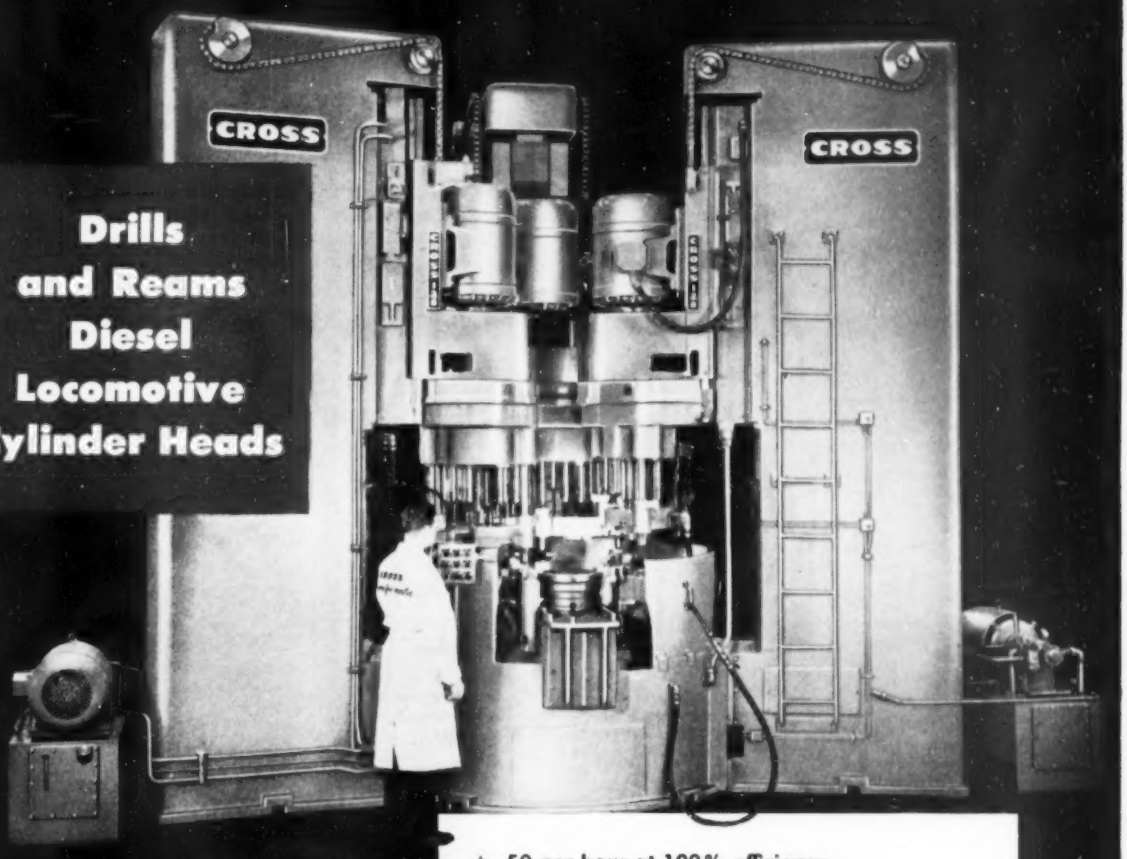
JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worrry about your shortcomings as a draftsman, photographer or author —every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER – Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 36, N. Y.

Another Special by Cross



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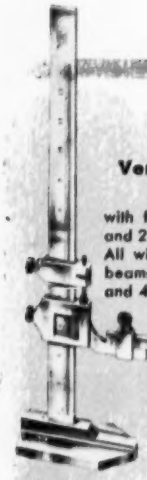

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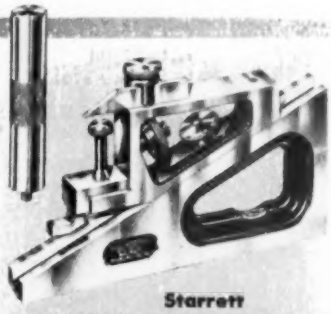

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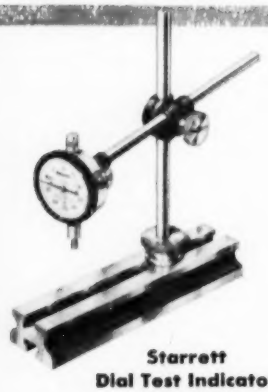

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ABRASIVE MEDIA AND ADDITIVES USED FOR SLIDA BRADING

ITEM	ALUMINUM OXIDE CHIPS	STONE CHIPS	STEEL BALLS	FOUNDRY STARS AND SLUGS	MOLDED ABRASIVE AND IRON SLUGS
Characteristics & Uses	Available in nine sizes and two grades. Cuts 1/3 faster than natural stone. Untumbled grade has tendency to break and therefore, pretumbled grade is preferred.	Natural Stone Chips of various kinds and sizes. Preferable to aluminum oxide for a polishing action when lubricants are added. Used primarily for metal removal or barrel polishing of metals.	Used only for burnishing along with water or other lubricants such as soap.	Used for burnishing or for adding weight to other media.	Made from iron powders and abrasive materials. Used for metal removal. New abrasive surfaces appear as slug wears.
Sizes Used	No. 12 Mesh to 1½" x 2"	1/16" Dia. to 1½" x 2"	1/16" and 1/8"	All sizes – ½" & 1" popular	Manufactured at Laboratory ½" Dia. x ¼" thick
Cost	16¢ - - - - - - 20¢	11¢ lb. (Average)			Estimated Cost – 40¢/lb. Not yet available on market.
Trade Name	1. Super-Honite 2. Alundum	1. Honite 2. Rotofinish 3. Mecha-Finish	1. Abbott Steel Balls 2. Burnishing Balls 3. Hartford Burnishing Balls	Steel burnishing stars and slugs	
Supplied By	1. Minnesota Mining & Mfg. Co. 2. Norton Co.	1. Minnesota Mining & Mfg. Co. 2. Sturgis Co. 3. Mecha-Finish Co.	1. Abbott Ball Co. 2. Hanson Van Winkle Munning Co. 3. Hartford Steel Ball Co.	1. Abbott Ball Co. 2. Hartford Steel Ball Co.	
Approximate Life	On pretumbled grades loss is slight, average about 2% to 4% per average 6 hour run.	Rescreen after 24 hours of use and re-sort for size. Loss approximately 2% per average 6 hour run due to powdering.	Life varies extremely. With good care to prevent corrosion, balls should last one year.	Life varies. With good care to prevent corrosion, stars should last one year.	Long wearing. Estimated at twice that of stone chips.

OPERATION USES	Ferrous	Non-Ferrous	Plastics	Ferrous	Non-Ferrous	Plastics	Ferrous	Non-Ferrous	Plastics	Ferrous	Non-Ferrous	Plastics	Ferrous	Non-Ferrous	Plastics
Abrasive Cutting	Yes	Yes	No	Yes	Yes	Some	No	No	No	No	No	*	Yes	Yes	No
Barrel Polishing	Yes	Yes	No	Yes	Yes	No	No	No	No	No	No	No	Yes	Yes	No
Burnishing	No.	No	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No

*with micarta

ADDITIVES

ITEM	WATER	ALKALI COMPOUNDS	SODA ASH, TRISODIUM PHOSPHATE	BURNISHING SOAP
Use or Characteristics	Coolant lubricant. Keeps chips clean.	Detergent, softens water, promotes clean parts and chips. Retards rust. Abrasive-alkali compounds clean chips that tend to load.	Wetting agent, softens water. Helps prevent rust until parts are dried.	Lubricant to prevent abrasive action. Causes burnishing or barrel polishing only.
Trade Name of Formula		1. Honite Compound No. 2 2. Alkaline Compound 3. Tumbling Compound	Any brand Many suppliers	1. Acme 2. Honite Compound No. 1
Approximate Cost		20¢ / lb.	Soda Ash 02¢ / lb. Tri. Sod. Phos. 04¢ / lb.	12¢ to 35¢ / lb.
Supply Sources		1. Minnesota Mining & Mfg. Co. 2. Frederick Gumm Chemical Co. 3. Hanson Van-Winkle-Munning Co.	Any	1. Acme Packing & Supply Co. 2. Minnesota Mining & Mfg. Co.
Ordering Quantities		50#	Any	10#

Note: Other media such as Rubber Bonded Abrasive Chips, Crushed Sand, Oil and Aluminum Oxide Grains and Abrasive Coated Wood Balls are sometimes times used, but the same or better results can be accomplished with the media summarized in this table.

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thru *faster* continuous broaching of multiple parts

• Wherever metal is removed on duplicate small parts you are apt to find a place where Footburt Surface Broaching Machines can cut manufacturing costs. Production is high, and tool maintenance is low in cost per piece. We have had many years of experience in designing the tooling for various types of parts and will gladly advise you in applying surface broaching to your work.

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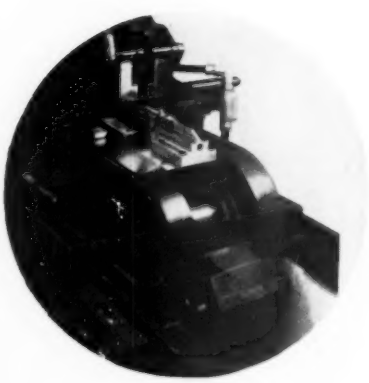

• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

FOOTBURT

MACHINE TOOLS

Actual Minutes for Tapping...I

BY V G HOTCHKISS, Industrial Engineer, DEERE & CO

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These tables give the recommended speeds and actual minutes for tapping grey iron, malleable iron, and mild steel products, where extremely close tolerances are not required, as in the higher classes of fit, when HSS taps are used.

Table I is for tapping with pipe taps. The ⅛-, ¼-, and ⅜-pipe tap sizes are frequently used for grease fittings. The table gives the recommended fpm and corresponding rpm for each size and material. Actual minutes per hole for pipe tapping is the complete time, because the number of threads to be tapped is a fixed number. The time includes from the moment the tap makes contact in the hole until the tap can be raised from the tapped hole.

Tables IIA and IIB are for tapping American National Coarse (NC) and Fine (NF) series threads. These tables give the recommended fpm and corresponding rpm for each size and material. Table IIA is the variable part of a tapping job, and Table IIB is the constant part. Both tables are always used together to calculate the total time per hole.

Table IIA gives the actual minutes per inch depth of hole, a variable. Multiply the time shown in the table by the actual depth of hole. To this result add the constant from Table IIB, recognizing the material tapped, and the type of tap used (whether taper, plug, or bottoming).

In addition to recognizing the number of threads chamfered on the various types of taps, an al-

table I ... ACTUAL MINUTES FOR TAPPING WITH PIPE TAPS (HSS)

Pipe Size	OD In.	Threads per In.	Total Length of Thread, In.	Number of Threads	Rpm Required: Grey Iron @ 80 fpm	Rpm Required: Malleable Iron @ 60 fpm	Rpm Required: Mild Steel @ 60 fpm	Actual Min. per Hole*: Grey Iron	Actual Min. per Hole*: Malleable Iron	Actual Min. per Hole*: Mild Steel
⅛	.405	27	.375	10.1	754	565	565	0.042	0.051	0.051
¼	.540	18	.569	10.2	565	424	424	0.051	0.063	0.063
⅜	.675	18	.575	10.4	452	339	339	0.061	0.076	0.076
½	.840	14	.748	10.5	364	273	273	0.073	0.092	0.092
¾	1.050	14	.788	10.6	291	218	218	0.088	0.112	0.112
1	1.315	11½	.944	10.9	232	174	174	0.109	0.140	0.140

Above table includes 3 imperfect threads
** Includes reverse tap at 0.015 min.*

EXAMPLES OF PIPE TAPPING

1st Example
Material: Grey Iron
Size: ⅛ in. pipe tap
Actual min.: 0.042

2nd Example
Material: Malleable Iron
Size: ⅜ in. pipe tap
Actual min.: 0.076

3rd Example
Material: Mild Steel
Size: ⅛ in. pipe tap
Actual min.: 0.063

EXAMPLES OF TAPPING AMERICAN NATIONAL COARSE AND FINE THREADS

1st Example
Material: Grey Iron
Depth of hole: ½ in.
Size of tap: ¼ in.-NC
Taper tap

½ × 0.029 = 0.015 min.
Constant = 0.032 min.
Total = 0.047 Actual min.

2nd Example
Material: Mild Steel
Depth of hole: 1½ in.
Size of tap: ½ in.-NC
Plug tap

1½ × 0.049 = 0.074 min.
Constant = 0.041 min.
Total = 0.115 Actual min.

3rd Example
Material: Mild Steel
Depth of hole: ¾ in.
Size of tap: ⅜ in.-NF
Plug tap

¾ × 0.067 = 0.050 min.
Constant = 0.035 min.
Total = 0.085 Actual min.

4th Example
Material: Malleable Iron
Depth of hole: ⅝ in.
Size of tap: ⅜ in.-NC
Bottoming tap

⅝ × 0.045 = 0.028 min.
Constant = 0.019 min.
Total = 0.047 Actual min.

Hanson-Whitney

announces

the new

the latest additions to its famous Hanson Processes

Hydraulic Thread Milling Machine

The Most Revolutionary Improvement in Thread Milling Since the Invention of the Thread Milling Machine in 1901 by the Late B. M. W. Hanson, Founder of the Company.

new features

Hydraulic-driven cutter and work spindles insure balanced cutter speed and work feed — provide rapid traverse carriage. Variable cutter speeds up to 3,000 R. P. M. make possible instant adjustments during operating cycle. High speed permits efficient use of carbide cutters where applicable. The famous Hanson features of interchangeable lead cams, cross-feed cams, and completely semi-automatic operating cycles are retained in these machines.

Extensive field tests prove increased production, accuracy, and improved finishes. Production costs cut in half . . . cutter life three times greater.

Manufactured in the following capacities: 4" x 9", 10" x 24", 15" x 30", and 20" x 48". Longer beds to suit customers' requirements.

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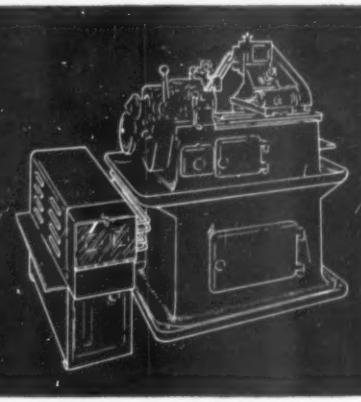

Actual Minutes for Tapping...II

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table IIA . . . ACTUAL MINUTES PER INCH FOR TAPPING AMERICAN NATIONAL COARSE AND FINE THREADS

Size	Threads per In. (Coarse)	Threads per In. (Fine)	Rpm Required: Grey Iron @ 90 fpm	Rpm Required: Malleable Iron @ 70 fpm	Rpm Required: Mild Steel @ 70 fpm	Actual Min. Per 1" Depth of Hole: Coarse Thread Series: Grey Iron	Coarse Thread Series: Malleable Iron	Coarse Thread Series: Mild Steel	Fine Thread Series: Grey Iron	Fine Thread Series: Malleable Iron	Fine Thread Series: Mild Steel
5**	40	44	2748	2138	2138	.029	.037	.037	.032	.041	.041
6	32	40	2489	1936	1936	.026	.033	.033	.032	.041	.041
8	32	36	2095	1629	1629	.031	.039	.039	.034	.044	.044
10	24	32	1808	1406	1406	.027	.034	.034	.035	.046	.046
12	24	28	1590	1237	1237	.030	.039	.039	.035	.045	.945
1/4	20	28	1374	1069	1069	.029	.037	.037	.041	.052	.052
5/16	18	24	1099	855	855	.033	.042	.042	.044	.056	.056
3/8	16	24	916	713	713	.035	.045	.045	.052	.067	.067
7/16	14	20	785	611	611	.036	.046	.046	.051	.065	.065
1/2	13	20	687	534	534	.038	.049	.049	.058	.075	.075
9/16	12	18	611	475	475	.039	.050	.050	.059	.076	.076
5/8	11	18	550	428	428	.040	.051	.051	.065	.081	.084
3/4	10	16	458	356	356	.044	.056	.056	.070	.090	.090
7/8	9	14	393	305	305	.046	.059	.059	.071	.092	.092
1	8	14	344	267	267	.047	.060	.060	.081	.105	.105
1 1/8	7	12	305	238	238	.046	.059	.059	.079	.101	.101
1 1/4	7	12	275	214	214	.051	.065	.065	.087	.112	.112
1 3/8	6	12	250	194	194	.048	.062	.062	.096	.124	.124
1 1/2	6	12	229	178	178	.052	.067	.067	.105	.135	.135

** *First 5 items are machine-screw sizes*

table IIB . . . ACTUAL MINUTES PER HOLE* (Constants to be Added to Table IIA)

Size**	For Grey Iron: Taper Tap 10-Thread Chamfer	For Grey Iron: Plug Tap 5-Thread Chamfer	For Grey Iron: Bottoming Tap 1 1/2 Thread Chamfer	For Malleable Iron and Mild Steel: Taper Tap 10-Thread Chamfer	For Malleable Iron and Mild Steel: Plug Tap 5-Thread Chamfer	For Malleable Iron and Mild Steel: Bottoming Tap 1 1/2 Thread Chamfer
5	0.024	0.020	0.016	0.026	0.022	0.016
6	0.025	0.021	0.016	0.027	0.022	0.017
8	0.026	0.022	0.016	0.030	0.024	0.017
10	0.028	0.023	0.017	0.032	0.025	0.017
12	0.030	0.024	0.017	0.034	0.026	0.017
1/4	0.032	0.025	0.017	0.037	0.028	0.018
5/16	0.037	0.028	0.018	0.043	0.031	0.019
3/8	0.041	0.030	0.018	0.049	0.035	0.019
7/16	0.046	0.033	0.019	0.054	0.038	0.020
1/2	0.050	0.035	0.019	0.060	0.041	0.021
9/16	0.054	0.038	0.020	0.066	0.044	0.021
5/8	0.059	0.040	0.020	0.071	0.048	0.022
3/4	0.067	0.046	0.022	0.082	0.054	0.023
7/8	0.076	0.051	0.023	0.094	0.061	0.025
1	0.085	0.056	0.024	0.105	0.067	0.026
1 1/8	0.094	0.061	0.025	0.116	0.074	0.028
1 1/4	0.102	0.066	0.026	0.127	0.080	0.029
1 3/8	0.111	0.071	0.027	0.139	0.087	0.030
1 1/2	0.120	0.076	0.028	0.150	0.094	0.032

* *Includes reverse tap at 0.015 min.*
** *First 5 items are machine-screw sizes*

lowance of two (2) threads overrun has been included in Table IIB, plus 0.015 min. machine time for reversing the tap.

The total time includes from the moment the tap makes contact in the hole until the tap can be raised from the tapped hole.

In all cases the speed of reversing the tap is the same as during tapping. If reversal speed is double the tapping speed the actual minutes would be 75% of the actual minutes shown, with the exception of the 0.015 min. to reverse the tap.

The set-up makes or breaks the job, *says Stainless Sam*

PART: Valve needle for steam trap. Made of Type 303 bar stock.

OPERATION: Rough and finish turning, and cut-off.

EQUIPMENT: Automatic screw machine.

PROBLEM: Poor finish on conical valve point which must be accurate and smooth to maintain a leakproof seat in trap.

ORIGINAL SET-UP: Roughing cut was made close to collet with combination cut-off and form tool. Because use of conventional stop damaged the rough turned point, it was necessary to:

1. Move bar stock up to cutting-off position before starting finishing cut and
2. Leave 15-thousandths for finishing cut. This was done to compensate for collet run-out and to leave enough material to turn a good point on the conical portion. The relatively heavy finishing cut combined with the chatter from collet over-hang made it difficult to produce a good finish even with carbide tooling.

HERE'S HOW STAINLESS SAM SOLVED THIS PROBLEM:

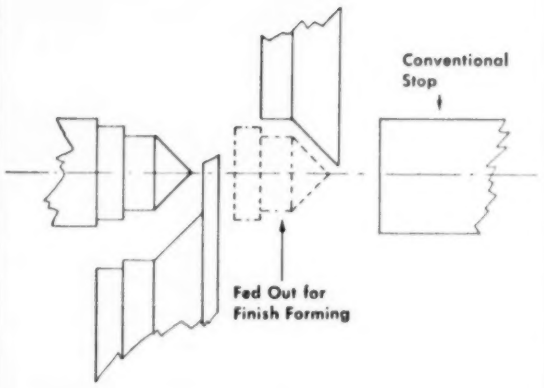
The stop was bored out to permit locating bar for cut-off operation against turned shoulder instead of against conical point.
This simple change made these things possible.

1. Permitted rough and finish turning in the same collet position.
2. Prevented damage to conical point, shortened over-hang and eliminated collet run-out. This made possible reducing finishing cut to 5-thousandths.
3. Finish was improved greatly.

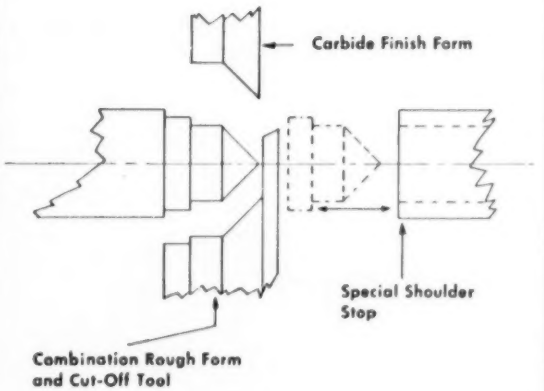
• • • •

Further information on machining stainless is given in the booklet, "Machining Armco Stainless Steels." Write us or ask your Armco Distributor for it. He can give you quick delivery on Armco bar stock too.

ORIGINAL SET-UP



MODIFIED SET-UP



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ARMCO

TALKING SHOP

Chilling Drafts

MAGNESIUM PARTS could not be held to close machining tolerances at one plant, even though standard practice was apparently being followed in allowing proper cooling periods between operations, in machining methods, and in storing between operations in locations where temperature variations were minor. Two things were found to be causing the trouble: First, as an operator completed his operation on a part, he stacked it on a skid. Thus parts machined last were on top. The next operator naturally worked from the top down. Thus top pieces did not have the full cooling period while bottom ones had more than necessary. Inverting stacks between operations solved this one . . . Second, operators in some departments were found to be opening windows in skylights above the work so cold air blew in on parts. This caused extreme temperature variations. Control of skylight ventilation whipped this one—and close tolerances became possible.

Three Milling Troubles

A WORKS MANAGER tells us of a side-milling operation which had been running satisfactorily for months. But suddenly, a taper appeared. A careful check showed every thing in order on the miller. Finally, the cutter itself was found to have a run-off of 0.009 to 0.015 in., and the cause was then isolated in the tool grinder. The head was out of alignment, producing the run-off . . . At the same plant, end mills for cutting keyways to close tolerances had very short life, causing considerable time loss in tool changes. The cure was to grind the end mills to the high limits; thus lengthening life between grinds. Purchased end mills were found often to be 0.0005 in. undersize. The solution here was one of tool control — to grind even new cutters to the high limit, then check them before release to the department. Operators were issued enough cutters to make trips to the tool crib during the shift unnecessary.

Another plant has recently experienced trouble with vertical millers cutting aluminum and magnesium dry. Chips stick to the ways, and galling has occurred. Examination shows the galling apparently starts in pits or blowholes in way surfaces, where the chips collect into a ball. But is the fault with the pits, way lubrication, or something else? Nobody knows the answer yet.

Spot-Welding "H" Magnesium

IN SPOT-WELDING "H" magnesium, one company attempted to follow procedures used in spot-welding other types of magnesium, insofar as preparing the surface was concerned. However, the welders ran into trouble right away. Quite often, they would burn holes clear through the material. Production men discovered that it was necessary to clean the surface thoroughly to the point of having a high lustre on the surface to be welded. When this is done, no difficulty is experienced.

$$ from Non-Chipping

WE FREQUENTLY hear the flat statement that increasing machining speeds decreases tool *life*. Tain't so! Tool *wear* increases with surface speed, to be sure, and the tool that cuts faster wears faster. But at slow speeds, there's the problem of the builtup edge. Chips weld to the tool tip, then break way, each taking its little bit of carbide along. Eventually, the little chips become noticeable as the tool chips and spalls. Also, chipwelding increases tip heating and permits alternate heating and quenching of the carbide tool tip as the built-up chips break away, bad for any carbide. Thus, by increasing speed, you may *lengthen* tool life by reducing or avoiding the chipping that means regrinding oftener and deeper. What's more, the higher speed makes production time less on the job and gives better finish. Poor finish on a cut always suggests that surface speed is too slow. . . . Just be sure that tool finish and coolant application are right at higher speeds.

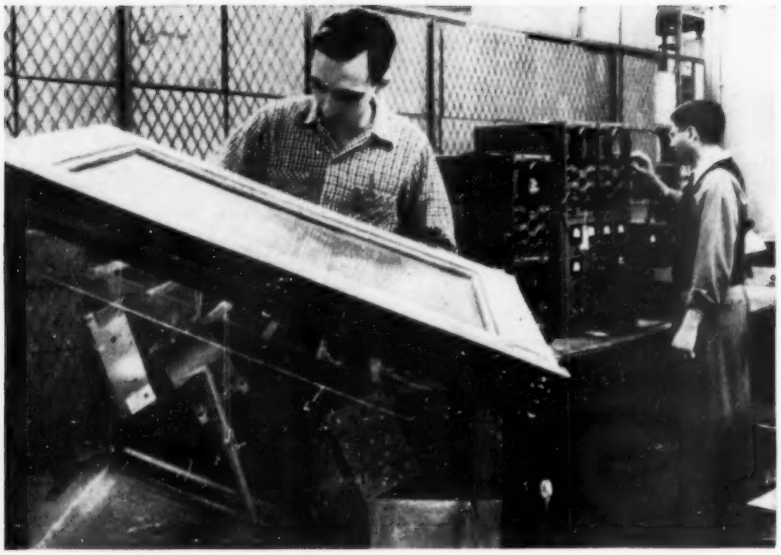
Intermittent Cuts

IF THE MACHINING JOB with carbide requires an intermittent or interrupted cut, try it without coolant. The alternate heating and cooling that occurs when the tool cuts and doesn't cut becomes heating and quenching with coolant, and that's bad for carbide; the strains and shocks cause cracks. A tool ground with slight negative rake, cutting dry, will usually last longer.

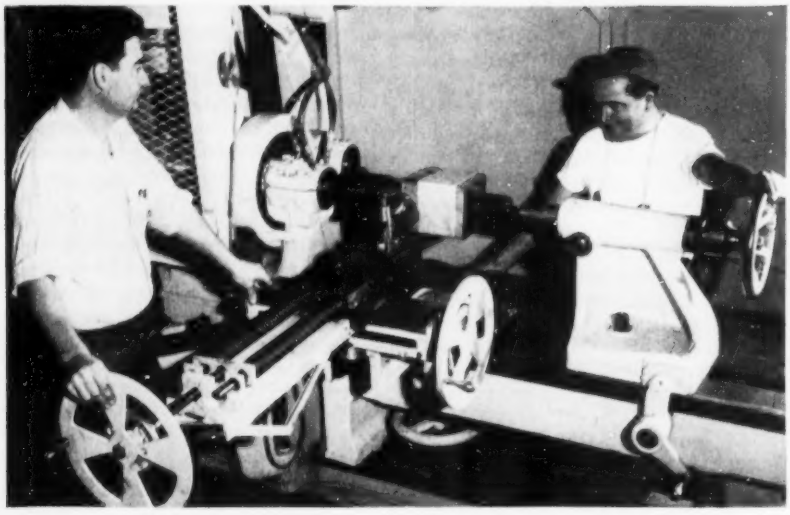
Time Down; Cost Up

UNKNOWN to the foreman (of one well-known plant), one of several welders working on identical operations substituted weld rod of different specification than that called out for the job. The immediate result of this substitution was a reduction in time necessary to perform the operation. Several other operators also substituted this rod, and the net increase in production was gratifying to both operators and the departmental supervisor. The supervisor assumed the increase in production to be the result of increased effort by the welders.

Pressure-testing operations on these parts were performed, and the occurrence of weld leaks increased by approximately 75%, with resultant rework increasing proportionately. Spotting the cause and correcting this condition were delayed by several days because welding operators attempted to "cover up" their substitution and "improved method," being oblivious to the result of the unauthorized substitution. By eliminating the possibility of indiscriminate tool and or material substitution by the operators, the recurrence of such an incident has been avoided.



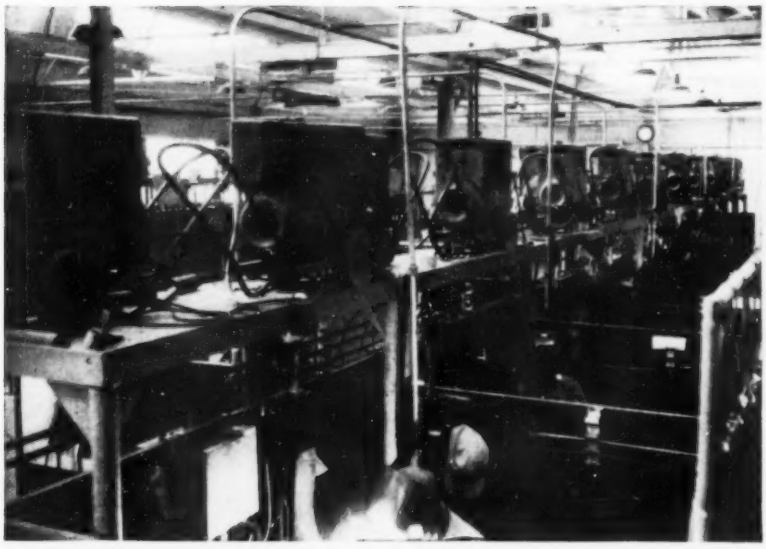
SALT-SPRAY BATH HAS GLASS WALLS, which allow laboratory technicians to see action during test without disturbing setup. Metal parts are chassis for electronic instruments. ***Allen B DuMont Laboratories***



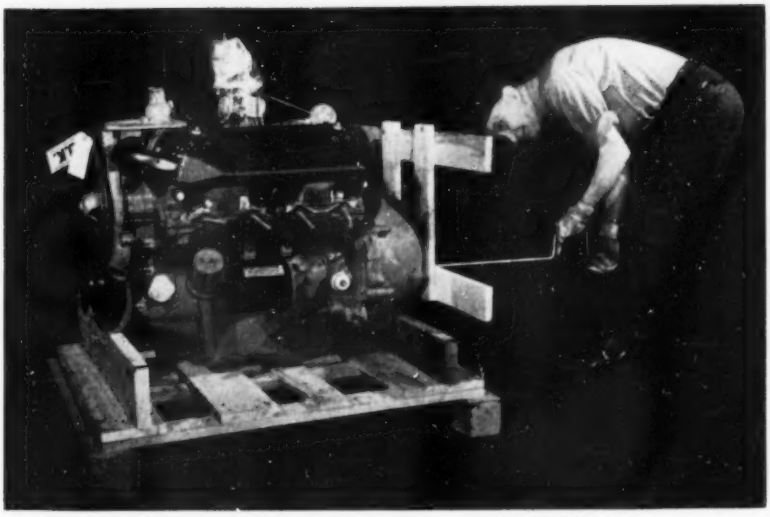
SHOP SHOTS

SPINNING LATHE PRODUCES SQUARES, hexagons, rounded corners and tapers in sheet metal. Block on arbor is made of hardwood, Masonite, Micarta, or other material easily shaped to exact inside dimensions of required part. Special rig with springs keeps roller pressed against stock and form. Metal thickness runs up to 0.090 in aluminum, 0.060 in steel. Largest dia formed so far is 12 in. ***Boeing Airplane Co***

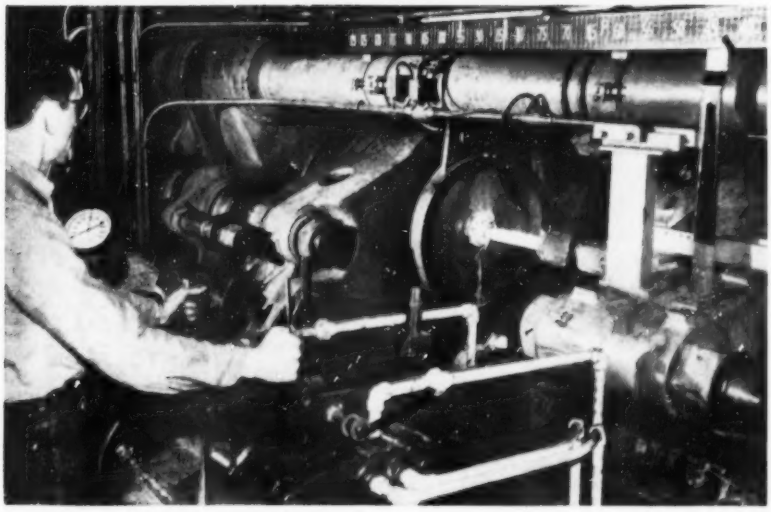
BIG JIG WEIGHS 3½ TONS; checks castings against data lines. Work is walking beam for 6-wheel military vehicle. Six air grinders, adjusted to fixed gages on base, spot grind locating points on castings for later machining jobs. ***Leyland Motors, Inc, England***



29 NEW WELDING BOOTHS for Heliarc operations feature overhead motor-generator sets, argon-gas lines, and lighting fixtures. Overhead motors cut air turbulence, a former cause of wasted argon. Footswitches control welder output, making operations easier and quicker. Increased efficiency because of new installation amounted to 15% in 90 days. *Ryan Aeronautical Co*



PRIZE-WINNING ENGINE CONTAINER saves 90 lb of materials, cuts assembly time 60%, makes over-all shipping savings of 35%. A 786-lb Lincoln engine is set on base, then two side pieces are bolted to engine. Wirebound box and heavy paper are added, and engine is ready for railroad shipment. *Ford Motor Co*



GLASS LUBRICANT FOR HOT-EXTRUSION PROCESS permits forming alloy-steel seamless tubing on 2500-ton hydraulic press. This is only third or fourth application of "Ugine Sejournet" process, which calls for wrapping billets in spunglass and use of spunglass stocking over mandrel. Output is 2000 tons of tubes and other shapes a month. *U S Steel Corp*

News of Metalworking

nearly 1000 Machine Tools

TORONTO—Nearly 1000 machine tools, ranging in size from a miniature grinder to a 57-ton horizontal boring, drilling and milling machine, highlighted the Sixth Canadian International Trade Fair here June 1-12. Although the Fair was not primarily a machine tool show, they comprised by far its largest segment. Largest number of machines were of British origin, with Germany's a fairly close second. Canadian companies, however, were most in evidence, as most machines were exhibited by Canadian representatives.

Attendance for the first two days of the Fair was light because of a public holiday in honor of the Coronation. But judging from the number of pre-registrations, total attendance would reach 40,000 by Fair's end. This figure does not include a tally of the general public, admitted to the Fair on three days.

Twenty-Five Nations Exhibit

Virtually every available square foot of floor space was occupied by products of 25 nations. The increase over last year's occupied space amounted to almost 33%. By the end of opening day, almost one-fourth of 1953's 260,000 sq ft was booked for the 1954 Fair.

American exhibits included such well-known names as Brown & Sharpe, Giddings & Lewis, DeVlieg, Ingersoll, Bardons & Oliver, Cincinnati Bickford, Cincinnati Shaper, Cincinnati Lathe & Tool, DoAll, Sundstrand, Gisholt, Lodge & Shipley, National Automatic, New Britain, Sheffield, Rockford, Thompson Grinder, and many others; all, of course, shown by Canadian representatives.

French, Belgian, and Swiss machines, and a small number of Italian were exhibited. These were, for the most part, shown by one or more Canadian representatives, although the French Machine Tool Builders' Association had a large display at the Trade Fair.

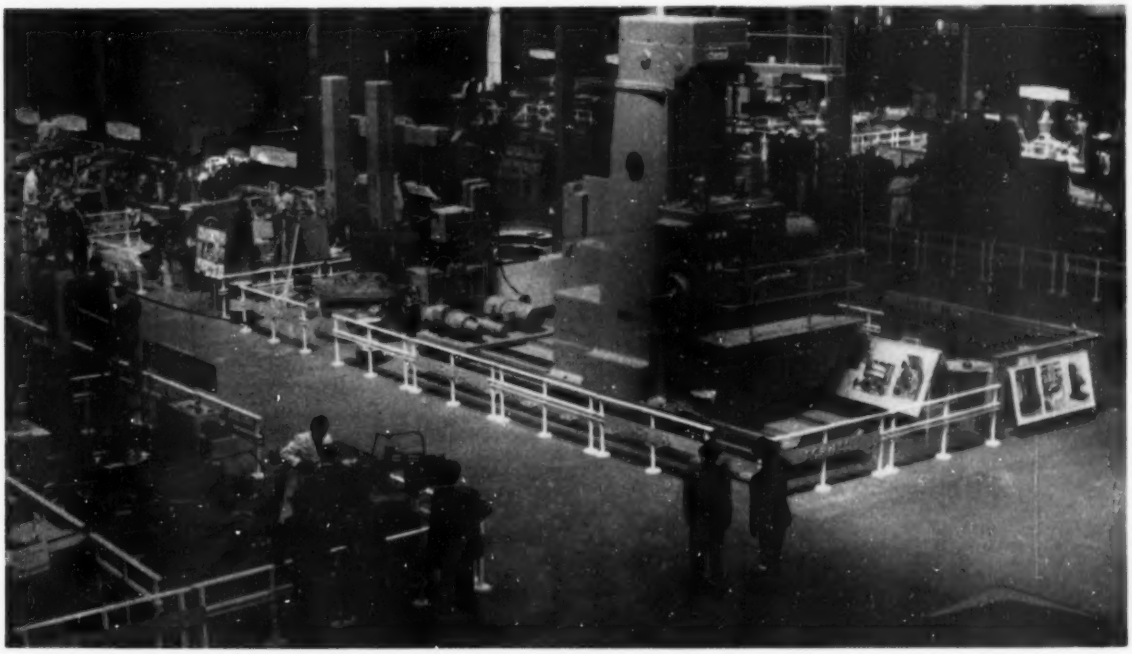
In a show held each year, many outstanding new machines or developments are not to be expected, and many of the exhibits looked familiar to visitors who had attended last year's Olympia and Hanover fairs. But there were some which were entirely new, or which had never before been shown on this side of the Atlantic.

Design Trends

One factor worth noting was the remarkable improvement in the appearance of Canadian-built machines since the first fair held five years ago. Not only was there an increase in the number of types shown, but the general styling had been modified. Some of the earlier machines had a chunky, box-like appearance that has now given way to smoother, cleaner lines.

Still evident on most of the foreign machines is the careful attention paid to exterior finish. Admittedly, a high-gloss paint adds nothing to the precision or productivity of a machine, but it does improve the over-all appearance of the plant in which it is installed, and leads to a general improvement in housekeeping.

Worth noting also, is what seems to be a universal trend to larger and heavier machines. With the constantly increasing demand for higher speeds and greater production, it is natural that machines should become more massive to withstand the heavier loads and reduce vibration, but concern is expressed in some quarters that this trend may



shown at Canada's Trade Fair

develop into a race between manufacturers to see which can produce the biggest machine, regardless of necessity.

Although American businessmen have always attended the Fair in substantial numbers, there was a noticeable increase this year, and on the first day alone, some 22 states were represented, including Texas, California, and Oregon, as well as New York and New England.

Registration was also counted from 34 overseas countries: from Britain, Continental Europe, the Commonwealth countries, and South America.

New Machines Shown

Easily the largest machine in the show was a 57-ton Schiess horizontal boring, drilling, and milling machine with a 6¼-in. spindle, shown by Kurt Orban. It was pointed out, however, that this is the smallest of its type manufactured by the company. An important feature of this machine is the dual set of controls, one on the machine, the other on a portable stand which can be placed, if necessary, inside the workpiece. This arrangement does away with the necessity of installing a telephone for communication between the operator and his assistant. Also shown by the same company were two vertical boring mills, one single-column, and one double-column. These machines feature preselective feeds and speeds, and automatic clamping and unclamping and raising and lowering of the crossrail.

Particularly interesting was a completely new Vertimax vertical production lathe shown by Charles Churchill. This is a vertical-spindle chucking machine equipped with twin tool slides which can be swiveled from below horizontal to beyond vertical, making possible in addition to normal turning, the simultaneous machining of two internal tapers, two external tapers, or an internal and external taper. Intended primarily for repetitive work, it can nevertheless be used for small-lot production, as setup is quite simple.

Also completely new was an Alfred Herbert 14/36 combination turret lathe with a 36-in. swing, 8½-in. hole through spindle, and a two-speed motor delivering 50 hp for turning and 12½ hp for threading. Machine has 16 speeds from 12 to 480 rpm for turning, and 5 threading speeds from 4 to 11 rpm. Crossslide nut has backlash eliminator to permit accurate taper turning, regardless of feed direction.

New to Canada

Shown for the first time in Canada was a Cardiff 8½-in. lathe, having a totally enclosed feedbox giving 40 Whitworth and 16 metric threads with single lever conversion from English to metric. Change gears are on fixed centers, but a small quadrant is supplied as an accessory for chasing special threads. Automatic knock-off with micrometer adjustment is furnished for the longitudinal feed, and the chasing dial is built in on the half-nut handle. Highly unusual is the use of sign language on all controls. For example, the coolant pump switch shows a faucet at the "off" position, and a faucet with fluid flowing at the "on" position.

Considerable interest was shown in the Alkett rotary swaging machine for producing internal or external profiles on bar or tabular

stock. Work is mounted on a hydraulic ram and forced under high pressure through shaped hammers. For internal work, a mandrel is attached to the ram end and the work is kneaded around this, the outside remaining circular. Splines, squares, and other internal shapes are readily produced, and the finish obtained is equal to that of fine grinding. Internal threading and barrel rifling can be performed, and magazine feed is available for short work.

William Asquith demonstrated a huge radial drill with a 10-ft arm and 16-ft over-all height. Designated the OD4, the machine has 18 speeds, 14 to 1100 rpm; 9 feeds, 0.002 to 0.04 ipr; and features power radiusing of the arm around the 27-in. column. Capacity is 4 in. in cast iron, 3½ in. in steel. Change gears permit tapping 6 to 40 tpi, and a 15-hp motor is mounted on the spindle.

The same company also showed a new quick-change tapping unit, the VT tapper, which permits instant changing from drilling to tapping without any adjustment. At the start of the operation, a collar is adjusted to the type of material to be cut. This adjusts the clutch to the appropriate slipping load. Thereafter, taps of varying sizes may be used without further adjustment, as the slipping load is regulated by the size of the tap adapter.

New in Canada were the Victoria V2 vertical and the U2R milling machines. Both have automatic feeds in all three directions, and the U2R also has rapid traverse from a 1-hp rotor-stator unit mounted in the knee. Also shown was the V1 vertical milling machine with hydraulic copying attachment. The unit is instantly removable to fit any Victoria mill and has a built-in 3 to 1 speed increaser and a built-in collet adapter to reduce overhang.

An interesting vertical drill was exhibited for the first time by Progress. Its outstanding feature is a compound table free to move right and left, in or out, on ball ways, and instantly locked in any position by a single lever. Adjustable stops are furnished for repetitive positioning. Feed lever is similar to that used on radial drills, automatic feed being obtained by spreading any one arm, stopped by raising any arm.

Unusual New Automatics

Brown and Ward showed a brand new high-speed automatic available in ⅝-, ¾-, and ⅞-in. sizes. According to the type of work to be performed, the machine can be made as a three-operation machine with plain tool slide, a four-operation machine with two-station turret, or a four-operation machine with two-station turret, including tapping and/or threading arrangement. Five spindle speeds are available, either 1200 to 4500 or 600 to 2250, and maximum length of work is 2½ in.

The machine is designed to take the place of ordinary automatics when only a few tools are required and time would be wasted by idle indexing of a normal turret. A larger machine, 1¼x4½ in. was also shown. This is available as a three-to-four-operation machine with a turret indexing through 60°.

Canada Machinery Co had in operation a special shaper attachment for machining both sides of turbine blades simultaneously. Control is by a master mounted in the fixture, and tools are set in small turrets to permit quick changing from roughing to finishing. A Canadian-patented CO_2 coolant system is employed, with a valve to cut off the flow on the back stroke.

A German profile grinder, the PeTeWe, had a number of unusual features. The operator sits at one side in front of a large glass screen on which an image of the work and the wheel face are projected. By means of two large steering wheels he guides the wheel face over the work profile. No special training is required. The machine can be used for face grinding of profile gages, split dies, and similar work; for relief grinding of form tools, for axial circular form grinding of cams,

and for radial circular form grinding of circular form tools, printing rollers, or other work. With an accuracy of 0.004 in. on the profile drawing, an accuracy of 0.0002 in. to 0.0001 in. can be produced in the work.

Alfred Schutte, Germany, introduced a new four-spindle automatic. To insure correct feed for each spindle position, feed movements for each longitudinal and cross-slide are independent. Two camshafts are provided to take care of the increased number of cams.

Built to Suit

Influence of the transatlantic market was seen in a lathe offered by Smart & Brown. Feature of this is a new headstock designed to meet requirements of the Canadian and American market with higher speeds, up to 4000 rpm, and larger collet capacity. It will accommodate 1-in. collets of Hardinge 5C type.

Also intended for the Canadian market was a Harrison lathe developed from a standard 14-in. swing machine. Bed has been increased in depth to give rigidity, and headstock gearing has been modified, the largest gear now being fixed to the main spindle. An American-type toolpost has been fitted.

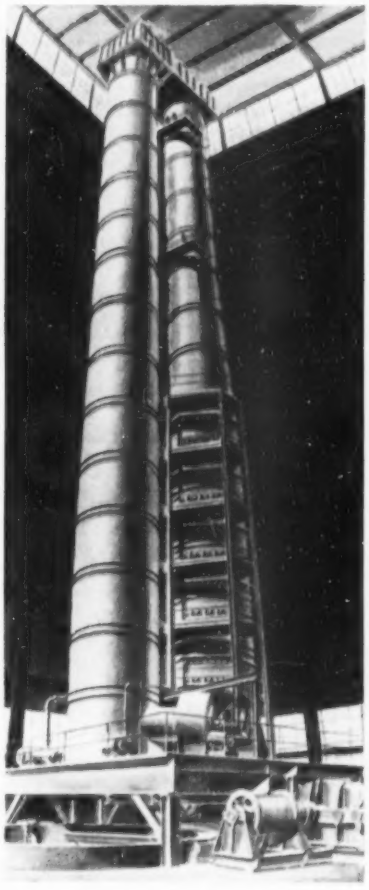
Rolling Gear Testers

Sykes introduced a new line of rolling gear testers known as Goulder machines. They feature vertical adjustment for gear alignment, super-sensitive Micro-Indicator in place of conventional dial indicator, with 5000X electrical magnifying recorder available, and interchangeable spur, wormwheel, spiral, and bevel attachments.

A A Jones & Shipman exhibited a 10-in. by 27-in. hydraulic spindle and internal grinder with an electronically controlled workhead and double-swivel backslide for taper grinding.

B Elliott & Co showed the Excel No. 2 and 3 surface grinders, new to Canada this year. The No. 3 is available with either 2-hp flange-mounted motor connected to the wheel by a flexible coupling, or with a totally-enclosed 2-hp cartridge-type unit.

A new model internal micro grinder was exhibited by Pultra Ltd. Designed for holes less than ½ in. in diameter, the machine has steplessly variable hydraulic table motion. Oscillation of 0.001 in. can be achieved. Spindle speeds of 65,000 rpm are provided. Headstock swing is 3½ in., and maximum distance from nose of wheelhead to nose of workhead is 5½ in. Maximum table reciprocation is 4 in.



WORLD'S TALLEST FURNACE — 13 stories high — is being built by Westinghouse Electric Corp for its Industrial Heating Dept at Meadville, Pa. The 130-ft tower will be used to heat treat long extruded aluminum shapes for aircraft. Gas-fired furnace will take 110-ft pieces, which will be suspended in tower, then water-quenched in pit below

Business Items

Bethlehem Pacific Coast Steel Corp has been awarded the contract to build **Ford Motor Co's** new $35 million assembly plant near Milpitas, Calif. One bay of the plant will have a depressed floor to accommodate two railroad tracks, one for the Southern Pacific and one for the Western Pacific.

Bone Engineering Corp, Glendale, Calif, has purchased **Centrifugal Investment Casting Co,** Burbank, Calif, as an aid in its manufacture of electronic equipment.

Morey Machinery Co, Inc, has moved its executive offices to 383 Lafayette St, New York 3. Showroom and sales department will remain at 410 Broome St, N Y.

Firth Sterling, Inc, has opened a Chicago office and warehouse at 3415 North Ave, Melrose Park, Ill, to expedite delivery of its tool and die steels and carbide products to area customers.

Rockwell Mfg Co is transferring its gas industry instrument production from Pittsburgh to its Macnick Division, Tulsa, Okla.

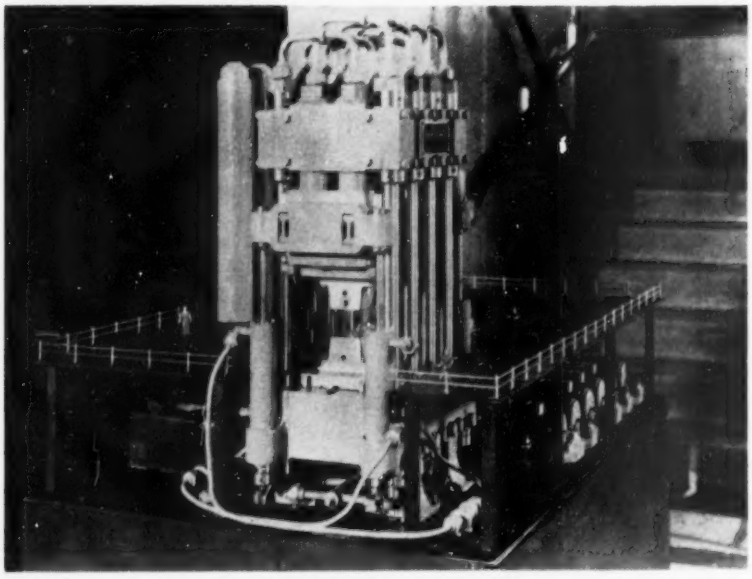
Connor Spring Mfg Co of San Francisco and Los Angeles has purchased manufacturing facilities of **L A Young Spring & Wire Corp's Mechanical Spring Division.**

Davis-Standard Sales Corp, Mystic, Conn, will market **Standard Machinery Co's** line of extruders and molding presses.

Wood Shovel & Tool Co, Piqua, Ohio, has purchased the physical assets and wheelbarrow production facilities of **Kilbourne & Jacobs Mfg Co** and has moved them to its Piqua plant.

Electro Refractories and Abrasives Corp, Buffalo, will shortly resume large-scale output of vitrified grinding wheels. The company dropped this production in World War II to concentrate on resin-bonded wheels. Capacity will be four times greater than prewar.

White Motor Co recently sold its Sterling Division plant and property for $750,000. White closed its Sterling operations on June 1, will manufacture the heavy duty trucks at its Cleveland plant.



MODEL OF 35,000-TON FORGING PRESS now under construction at Aluminum Co of America's Cleveland Works, which will eventually have this and a 50,000-ton press for fabrication of aircraft components. Press pictured here will extend 52 ft above floor level, 21 ft below floor level

US Pressed Steel Productivity Team Looks at British Metalworking

LONDON (McGraw-Hill World News) — Report of a 15-man US Pressed Steel Industry Productivity Team that in 1951 reversed the usual Europe-to-America flow to study the British metal stamping industry has been released by the Anglo-American Council on Productivity. Their eyewitness impressions of British industry:

- **Time and motion studies** "are made with emphasis on the time and not much attention is paid to the motion part. These are made primarily to establish piece-rates. There were few work simplification studies made, as compared with American standards."
- **Standardization** ". . . though becoming more prevalent, has by no means reached US standards." Common complaint of British executives: "Our customers won't let us standardize." Many assemblies noted that could have been simplified to increase output.
- **Tool and die design** are "fundamentally alike in both countries. Plants visited in Britain seem to have equipment which compares favorably with most American shops." Limited use of standard die sets was noted. Increased use is recommended.
- **Interchange of technical data** "could be liberalized as a means of raising productivity."
- **Pattern shops** are well-equipped with machinery and skilled men to run them. Apprentice system is excellent. Patterns are of high quality —often so highly finished they could be mistaken for product models.
- **Employers and unions** "appear to be at a high level of friendliness and cordiality, with individual workers responding with a maximum of effort and intelligent cooperation to the drive to increase productivity."
- **Worker morale** is "well ahead of America through maintenance of excellent welfare programs and good working conditions."
- **Working conditions** "Vary greatly from plant to plant . . . where conditions are bad, cause is usually a combination of antiquated buildings and equipment, plus reluctance to use new manufacturing techniques and methods."

Overall impressions: a great similarity exists between buildings and machinery. But the US metalworker makes use of a great many "little things" such as magnets and applied air power—all of which "reduce or eliminate human effort and increase productivity." These could well be applied to British metalworking.

Korean Truce Expected To Have Little Effect On Defense Production and Manpower Requirements

WASHINGTON—Truce in Korea will have little effect on defense spending, future planning and manpower take. Reason is that the Defense Department has been figuring on an arms build-up program as insurance against an all-out war—not as a counter-action against Korea's limited war.

Defense producers should not look for any big changes in defense contracting. Most programs will continue as currently scheduled—peaking late this year, then beginning to take an already-scheduled drop over the following 12 months. But there may be some immediate change in contracting for war expendables. Reason for this is that with the coming of a truce, supplies of ammunition, arms, clothing and materiel that would be expended in combat will now be stockpiled. Result is that the Defense Department will have to slow down contracting for these items to avoid too-rapid buildup of stockpiles.

This could mean a reduction of ammunition contracts three or four months from now. But these changes will be relatively minor compared with the entire defense procurement picture.

One immediate effect of Korea: abandonment of Congressional attempts to restore cuts in Air Force appropriations made by Defense Secretary Wilson. Former restoration proponents in Congress are now asking for bigger defense cuts. Wilson, too, has switched from defending his budget cuts to holding the line on military spending.

Wilson has reality on his side. Costs of Korea are going to stay high for another year or so—at least until a full armistice is signed and we can withdraw our troops completely. As Wilson pointed out to Congress, it costs a lot of money to keep an Army in the field, even if it isn't shooting, and UN forces have to be ready to go back into battle on a moment's notice.

So, while UN forces dig in on a stabilized front, they still need ammunition, equipment, food, clothing, etc. All of this takes money. Withdrawal to a neutral zone means a staggering jump in engineering costs. New highways, bunkers, lines of communications, garrisons, supply dumps and hospitals must be built —costly enough to offset the money saved by ending the shooting war.

The Manpower Situation

Although total military manpower will be cut from 3,356,000 to 3,300,000 by next fiscal year's end, draft calls will not change much. Big trouble is that manpower pools are drying up and draft boards will have to look elsewhere for men—post-Korean fathers and a larger number of college students are possibilities.

Since Korea, about 1.5 million men have been drafted and have seen service, and slightly more reservists have returned to duty for 18-24 month periods. Result is that the military and Selective Service can no longer rely on filling emergency requirements with veterans. Under the law, veterans are practically untouchable except in the event of all-out war.

This means that replacement quotas must be met by civilian manpower pools that will eventually have to include men who have married and had children since the outbreak of war in Korea.

Congress and Treasury Department Plan Overhaul of US Tax Laws

WASHINGTON — Businessmen are awaiting a tax reduction from Washington. But they are also awaiting the results of another piece of tax legislation currently before the House Ways & Means Committee.

It's an overhaul of all US tax laws and regulations, designed to correct inequities and clear up fuzzy spots caused by piling new taxes atop old ones.

When the repair job is over, almost every taxpayer will get a reduction, one way or another, but may get some raises, too.

These irons are in the fire:

- Liberalization of depreciation looks like a sure thing. House Ways and Means Committee has promised it, so has the Treasury.
- **General sales tax** has the Treasury interested. Despite its being a political bear trap that falls heavily on low income groups, tax theorists are swinging over to the idea.
- **Taxing of cooperatives** and such other tax untouchables as mutual savings banks, and industries operated by universities.

Joint Congressional Committee on Internal Revenue recently quizzed taxpayers on what bothers them most about taxes. Here are businessmen's pet peeves, in order of importance: double taxation of dividends, Excess Profits Tax, Section 102 (aimed at accumulation of surpluses), and depreciation rules.

Here's the way it looks:

- **Some relief for dividend incomes.** One idea: exempt the first $200 of dividend income. Another: adopt Canada's policy of exempting a flat percentage of income from dividends—say 20%.
- **Excess Profits Tax** will die January 1, sooner if Congress follows its own wishes.
- **Section 102 won't be dropped entirely.** A penalty will be retained, but present rules allowing temporary surplus accumulations only if a company plans to spend them soon, will be relaxed.
- **Earned-income deductions** may be restored to offset political effects of relaxing the income-from-dividends tax. If restored, it will be at a considerably higher maximum than pre-WWII's $56.
- **Excise taxes** in general will probably be increased to offset other reductions. But the highest levies (20% on cameras, sporting goods) may be lowered. Idea would be to spread excises over more products at the 8-10% level now in effect on automobiles and appliances. A possibility: the agitation for a general sales tax may wind up as a broader application of excise levies.

Floor fights in Congress over major recommendations are probable. This means business will have to wait until the close of next year's session to learn what the nation's future tax structure will be.

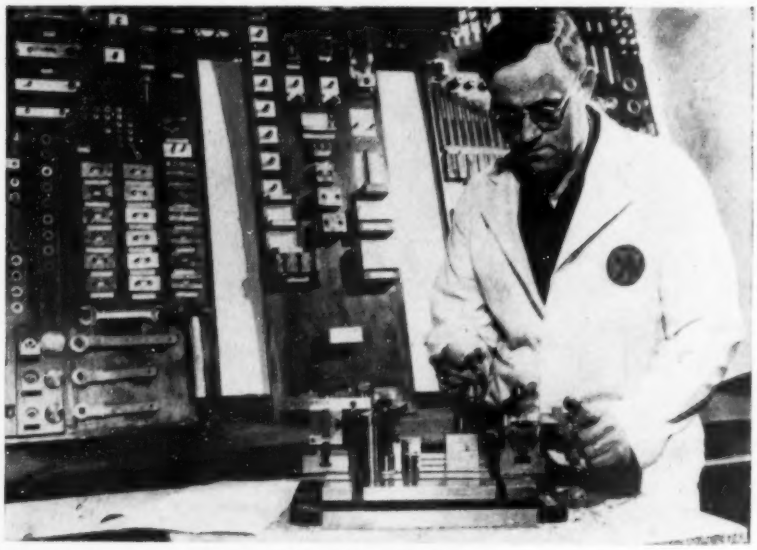
Distributors Named

Christy Equipment Co of Omaha has been named distributor for Clark Equipment's line of materials handling trucks and tractors. Territory includes all of South Dakota and parts of Iowa, Nebraska, and Minnesota. Dealership replaces Clark agency at Sioux Falls, S D.

Duma Steel Corp, Pittsburgh, Pa, has opened a warehouse at Marietta, Ga, to serve seven Southeastern states. Stock will be various steel shapes and forms, purchased as far as possible from Southern manufacturers.

Robert H Newton Co, Cleveland, Ohio, has been named sales representative for Ohio and part of western Pennsylvania for **Multi-Hydromatic Welding and Mfg Co,** Detroit manufacturers of resistance welding equipment.

Solar Steel Corp, Cleveland, will build a warehouse in Cincinnati to replace its present warehouse.



"ERECTOR SET" FOR TEMPORARY TOOLING, composed of interlocking blocks, clamps, bolts, bushings and other parts that can be assembled in an almost infinite number of combinations, is reported to be saving both time and money at General Electric's J-47 jet engine plant, near Cincinnati. The Wharton System consists of some 450 basic pieces that can be used to assemble jigs and fixtures for machining and assembly work

The Telenar Story: Munitions Board's Standing Invitation To Demonstrate "Revolutionary" Process Goes Unanswered

WASHINGTON — The Munitions Board is unwilling to recommend investment by the armed services in the Telenar cold flow precision press until its proficiency has been adequately demonstrated. Raymond N Skilton, chief proponent of the process, was asked by the Board in April 1950 to make a presentation but thus far has not done so. Previous tests on a prototype model are regarded as inconclusive.

This is the answer of the Munitions Board to the charges made by Mr Skilton, aired recently in a series of sensational articles in the New Bedford (Mass) Standard-Times, that he has tried unsuccessfully for 13 years to interest the government in the press which would "revolutionize the machine tool industry by incorporating a process for shaping metals without heat or percussion."

The Munitions Board asked Mr Skilton specifically to demonstrate these points:

- Advantage over existing equipment in production, material and labor.
- Can the machine work metal other than mild steel?
- Why and how the metal flows.
- Are lubricants necessary?
- Maximum and minimum sizes of material that can be worked.
- Skilton's legal right to Telenar.
- Show four specified ammunition parts produced by Telenar.

Skilton has never made the presentation. Until he does, the government won't consider Telenar.

Shown to Ordnance in '42

Mr Skilton demonstrated his machine at New Haven, Conn, to Army Ordnance officials and industrialists in August 1942. The machine punched holes 5/8-in. in diameter in 5/16-in. thick steel. Punching time was much slower than on existing presses, the stroke taking about 5 seconds. Only advantage was the smoothness of the punched holes.

Springfield Armory officers decided after the demonstration that evidence was lacking to prove that this press could cold-flow parts for small arms. Representatives of many companies qualified to judge the merits of new processes, as well as Ordnance officers, agreed that nothing particularly new had been shown.

In 1943, the press was praised by several Air Force officials, who recommended that the government subsidize it. Five years later, however, the Air Force again tested it and said it did not merit support.

Skilton implies that "mysterious interests within and through government"—representing the machine tool industry—have blocked government procurement. Senator Tobey (R, N H), chairman of the Senate Commerce Committee, has ordered his staff to investigate. Senator Kennedy (D, Mass.) has urged Defense Secretary Wilson to make a similar probe.

During WWII, Skilton negotiated with the War Production Board and the Armed Services, seeking government money and orders. According to the Munitions Board, WPB offered Skilton a contract for 10 presses. But he was dissatisfied with the size of the order and never went into production.

The press was invented over 20 years ago by the late Dr Charles Howland-Sherman of Hamden, Conn.

Jones & Lamson Conducts High-Level Machining Seminar Series for Production Executives

SPRINGFIELD, VT — Jones & Lamson Machine Co has been conducting monthly, for the past-year, a series of 2-day seminars for shop executives of customer companies. Groups of about 25, either from plants of one large customer company, or from unrelated plants in a certain geographical area, come in at their own expense to learn results of recent J & L research and development programs. First group, last June, was the GE turning subcomittee, the second was from Allison. Technical-magazine editors were invited to join a group of production executives from Milwaukee May 26 and 27.

Two-Day Seminars

Subjects discussed include outlining of the research and development program on metal cutting, a plant tour, review of J & L standardization of carbide tools, grinding of cutters and tools (including the incentive system), and a full afternoon of data on most-recent basic research on metal cutting by Leif Fersing and David Smith. Most of this material has already appeared in *AM*, in our pioneering series on high-speed machining or in specialized articles, ie, the description of the new dynamometer (*AM* Oct 13, '52).

High-Speed Machining

Visitors were shown ten specific machining jobs, all at higher than usual speeds. Seven turret-lathe turning jobs were operating at 400 to 600 sfpm, two tracer jobs on 1141 stock at 440 and 600 sfpm, a high-angle milling job in 1020 with ½-in. cut and 14½-ipm feed at 300 sfpm, and a ¾-in. bolt-turning job in 1315 stock at 720 sfpm which includes threading at 2000 rpm. Included in research described was that on forged 52100 bearing races, which resulted in 3° negative rake on turning and facing, and 2° positive rake on boring and ball-groove forming, at speeds of 600 to 700 sfpm. One bearing company is now operating at these speeds in production. Research on this and other jobs indicates that high-speed turning, with proper tool grinds and correct cutting fluid, cuts hp per cu in. of metal cut, increases accuracy in diameter and concentricity, and cuts distortion of the surface structure. This latter is particularly important for pieces to be heat-treated and ground, because it results in less cracking and spalling—sometimes blamed wrongly on grinding.

Another job described was the Ford rear-axle drive gear, on which optimum speed is 1200 sfpm with 0.015-ipr feed. Chips on this and other jobs are white, piece and tool are cool. In the increase from 900 to 1200 sfpm, for example, the 33-1/3% increase in speed cost only 9 to 10% in added power, and run-out was less than 0.002 in. despite wide variation in initial forgings. Still another job was on heat-treated 1045 alloy steel at 41 R., where an increase from 515 to 740 sfpm resulted in cooler chips, a better job.

Also in use at J & L are results of the Cornell chipbreaker studies for turning tool redesign.

Tornado Strikes Norton Co's New Plant: Damage Estimated at $1 Million

WORCESTER, MASS. — A tornado struck and heavily damaged Norton Co's $6 million Grinding Machine Division plant, opened here only a few weeks ago, on June 9 at 5:10 pm, causing an estimated $1 million worth of damage, primarily to the building.

Casualties—none killed, eight injured, a few seriously—would have been far greater except for the almost-miraculous timing of the twister. It hit at 5:10 pm, when most office workers had started home. If it had struck 20 minutes later, at 5:30 pm, the next shift would have been eating in the company cafeteria when the cafeteria's roof fell in. As it was, 11 Norton employees were killed by the tornado at home and on the way home, and 30 more Norton people and their relatives were injured enroute or at home. Some 30 automobiles in Norton's parking lot, which lay in the direct path of the tornado, were completely demolished.

Despite nationwide newspaper accounts to the effect that the Grinding Machine Division plant was "leveled," damage totaled $1 million, only one-sixth of the plant's value.

Cafeteria Demolished

The cafeteria was demolished, steel roof decking was blown hundreds of yards, windows were blown out, siding was stripped from framework all over the plant, and water from broken pipes, glass, debris and papers were strewn all over the building's interior.

Structural members were undamaged, however, and Gilbane Co, plant contractor, went to work the same evening preparing the roof structure for a new covering to avoid rain damage. Working night and day, the contractor and the Norton staff had the plant back in operation three days later, on Friday June 12.

Other buildings in the plant were undamaged except for lifting of roofs from one or two storehouses at the end of the plant.

Wheel Output Unaffected

Hundreds of well-wishers and customers called Norton following the disaster, asking if they could be of assistance. Many customers were concerned as to whether Norton's output of abrasive grinding wheels would be halted temporarily. Company officials wish to announce that its Grinding Wheel Division was not hit by the tornado, and that wheel production is affected in no way.

To aid its scores of employees made homeless by the twister, Norton promptly set up an emergency bureau to provide financial assistance. One of the company's disused buildings, formerly occupied by its Sheet Metal Department, was turned over to homeless employees for storage of such household goods as they could salvage. Guards were placed at the doors to safeguard valuables.

One interesting sidelight of the disaster: a man in Wellesley, Mass, some 30 miles away, picked up a tornado-borne Norton catalog on his front lawn.

AGMA Discusses New Gearing Standards At 37th Annual Meeting in Hot Springs, Va

HOT SPRINGS, VA — Increase in attendance beyond all expectations posed problems in housing and handling the 37th annual meeting of the American Gear Mfrs Assn at the Homestead here May 31 to June 3. Something like 350 members and their wives attended the annual banquet, an increase of about 100 over last year.

As is customary, most of the meeting time was devoted to committee and standards work, only two papers being presented, one engineering, the other commercial in nature. John Straub of American Wheelabrator discussed "Shot Peening in the Design of Gears" at a Monday morning session, stressing and explaining reasons for the shift from use of peening as a production-corrective device to a design consideration. Andrew Kennedy, Jr, of Westinghouse discussed "The Analytical Approach to Purchasing" at a Tuesday morning session.

Committees Active

About 25 meetings of committees during the three days worked on new and revised standards and data sheets. Nameplate standard 290.01 for gearmotors and enclosed gear drives is ready for executive action. Data sheet 462.01 on gearmotor overhung loads has been renewed and a progress report on standard motors for gearmotors is being developed.

Gearing Standards

Standard 430.02 on helical, herringbone and spiral-bevel gearing, and associated data sheet 270.01 are also ready for final approval. Designated sheets are being planned for enclosed gear drives and a committee is being formed on shaft-mounted or torque-arm units. Material is also being developed on thermal ratings for drives. Standard 421.03 on high-speed gearing will be revised to round out service factors for engine drives to one decimal place. A new data sheet on selection of high-speed gearing is being developed, and plans are under way for a list of application factors for motor and turbine high-speed drives. The proposed standard on aircraft spur gears, 411.01, will be ready by the October technical meeting. It is planned to query automotive manufacturers on whether data should be provided on the design and materials for automotive gearing.

A standard on meshing of fine-pitch worms with helical gears has been proposed, and standard 374.02 on design for fine-pitch worm gearing is being revised, as well as 236.03 on fine-pitch racks. Drawing standards for fine-pitch gearing are being studied as well as standards on rolling-mill, crane and rubber-mill gearing. Standard 340.01 on design of general industrial worm gearing is being revised.

The tentative standard 202.01, a standard system for beveled gears is ready for distribution and 208.01 and 209.01 on 20° straight beveled gears and spiral-bevel gears respectively will soon be ready for final approval.

Nomenclature

General formulas for strength and durability of all types of gearing has been worked out but not all numerical values have been developed as yet. Standard letter symbols for gear engineering and gear nomenclature are both in process of minor modification. The standard British glossary of gearing terminology has been checked against American terminology but involves so many differences that it is doubtful that the two can be correlated. Multi-thread hob standard 123.1 will be ready for approval by the fall meeting, as will a tentative draft on the worm-gear hob. Charles Staub of Michigan Tool has worked out a rough draft of a data sheet on care and use of hobs which will be expanded by contributions from other makers. Standard 201.01 on tooth form for involute spur gears is practically completed except for data sheets to be added on composite and stub tooth forms.

Lubrication and Corrosion

The five data sheets on lubricating oils, corrosion, extreme pressure lubrication, non-metallic gearing, and the handling of lubricating oils have been checked and reaffirmed. The standard on gear lubrication has been modified so selection of a lubricant will be based on peripheral speed rather than on center distance.

A committee is working on balancing of load on gear manufacturers in the event of total mobilization, while another one is developing information on statistical and materials control under the same conditions.

Pin Measurement

Pin-measurement standard 231.51 has been revised to use 1.68 pins for interior gears and 1.728 for exterior gears, with supplemental tables for

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Springfield, Vt

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Fred R Eberhardt
President
Eberhardt-Denver Co
Denver, Colo

use of off-size pins in emergency. Master gear standard 235.01 is also ready for final processing. Gear tool and inspection standards under the identification ASA B6.6 will be revised into two standards—one on spiral and helical and the other on hypoid and bevel gearing. Worm and worm gearing standard 234.01 is also ready for final processing.

IT'S NO. 7,000,000 FOR BUICK

FLINT, MICH — The 7 millionth Buick built since the company was organized 50 years ago rolled off the production lines at 10 am, June 8. The car is the 2,618,567th built since World War II, and came off the assembly lines 2½ years after the 6 millionth car. Buick is producing cars at an annual rate of 600,000, according to General Manager Ivan L Wiles.

Used Machine Tool Market Healthy Despite Recent Decline, Dealers Say

CLEVELAND — A tremendous potential market exists today for good, accurate, fairly modern rebuilt and used machine tools to replace the one-third of the nation's metalworking machines that are more than 20 years old, Swan E Bergstrom, vice president, Cincinnati Milling Machine Co, told members of the Machinery Dealers' National Association meeting here June 8-11. Mr Bergstrom, who is president of the National Machine Tool Builders Association, cited the important role used machinery dealers play in national defense and in keeping the machine tool industry healthy and vigorous.

Among objectives of MDNA for the coming year, as brought out in four days of business and technical sessions, are (1) a concerted drive to obtain a lower freight rate classification for transporting used machinery, (2) a constructive, far-reaching public relations program aimed at acquainting industry and the public with the Association's aims and service to industry, and (3) a campaign to promote a more rapid rate of depreciation on machine tools.

Consensus of attending members was that the industry faces a buyers' rather than a sellers' market and that, despite a business decline in the last few months, the future looks healthy for the used machine tool industry.

Richard Nathan of King's County Machine Exchange, Brooklyn, was elected president of the Association for 1953-54.

Soviet Automotive Industry Goes in for Automation

(McGRAW-HILL WORLD NEWS)— Soviet automobile industry is endeavoring to introduce automation into its production lines at some of its largest plants, and eventually hopes to make the plants completely automatic. For the first time in history, the Russians claim they are putting new models into production without a work stoppage. As the last of the old models were run off the belt recently, new models were being assembled at the other end of the conveyor.

The Soviet motor industry says it is now using transfer machines linked in groups to form automatic production lines, chiefly in the manufacture of cylinder blocks and pistons. One such line is claimed to have 228 spindles and 536 cutting and measuring instruments in simultaneous operation. The whole system is said to work without manual aid, producing one cylinder block every two minutes.

New Soviet models include 10 and 12-ton diesel trucks, 5-ton dump trucks, 7-ton trucks and semi-trailers.

Soviet designers are working on higher compression ratios, new motor fuels, and widespread introduction of electric automobiles for use in city traffic. If they succeed in the latter, gasoline vehicles will disappear from city streets.

Executive Committee Members

EXECUTIVE COMMITTEE MEMBERS

Thomas A Jones
President
W A Jones Foundry & Machine Co
Chicago

Raymond B Tripp
Executive Vice President
Ohio Forge & Machine Corp
Cleveland

R E Smallwood
Project Engineer
Industrial Division, Dominion Engineering Co, Ltd.
Montreal, Que, Canada

E C Denne
Consultant and Manager
Gear Department, United Engineering & Foundry Co
Pittsburgh

Dynamic Equipment Policy Center to be Set-Up At Illinois Tech, MAPI Washington Meeting Told

WASHINGTON — Formation of a National Center for Dynamic Equipment Policy at the Illinois Institute of Technology in Chicago was revealed at the 20th Anniversary Washington Conference of the Machinery & Allied Products Institute at the Hotel Statler June 11-12.

To Follow MAPI Formula

Gerald J Matchett of the Illinois Institute staff will be the director. The National Center will be devoted to teaching and research in the field of replacement of old production equipment on a regularized and scientific basis, as exemplified by the MAPI formula. Illinois Institute of Technology has the largest registration of engineering students in the country.

Reserves being accumulated for depreciation purposes by US industry are only about two-thirds of what they should be, George Terborgh, MAPI research director, declared. The deficiency is about $3 billion a year and now amounts to a total of around $30 billion over the years.

Usefulness of production equipment is greater in its earlier years than in the later years of its life, Mr Terborgh contended. Therefore, the depreciation allowed for tax purposes should not be uniform throughout its life, but should be rapid in the early years. As a rough estimate, write off of two-thirds of the cost within the first half of the useful life would be reasonable.

If industry kept correct accounting of depreciation, Mr Terborgh said, funds available for capital goods investment would be several billion dollars a year more than now.

Dollars spent abroad for technical assistance are likely to buy a lot more defense for us over there than the same dollars spent at home, Livingston T Merchant, Assistant Secretary of State, Bureau of European Affairs, said. Our power to resist communism must be considered with reference to the strength of our allies as well as of ourselves. He stressed the fact that Western Europe's health is partly dependent upon East-West trade and especially upon getting dollars from America.

Off-Shore Procurement

Only 15% of hard goods needed for defense of NATO countries and financed by the US has gone for off-shore procurement, Frank C Nash, Assistant Secretary of Defense, asserted.

Armament orders placed abroad have been mostly in tight fields such as ammunition in which US manufacturers are not being deprived of major chunks of business.

Mr Nash said that off-shore goods are being produced close to the point of use and at no higher price than here. By giving technical help to French manufacturers, the US has been able to get the cost of 105mm shell down in France from $48 at the beginning to $32 at present.

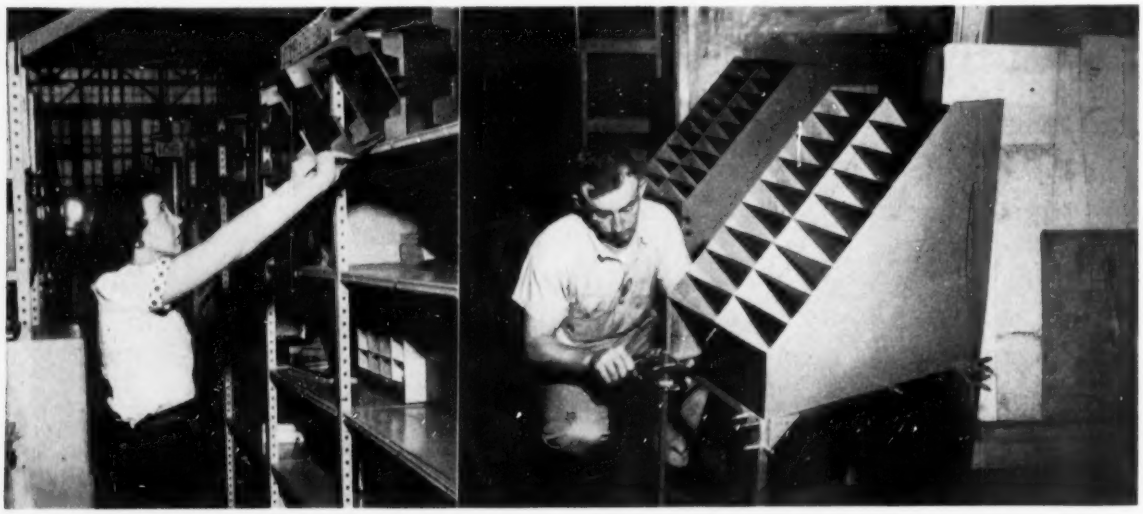
Long-Range Budgeting

Industry should consider long-range budgeting of its capital goods requirements, John R Bartizal, executive vice president of Clearing Machine Corp, said. Such budgeting should take into account (1) expansion of facilities, (2) new manufacturing methods, and (3) replacement needs. Promoting a dynamic equipment policy cannot be successful, Mr Bartizal pointed out, unless financing is available for purchase of new equipment that management needs to replace the old.

William J Kelly, MAPI president, presided at all the sessions.

SCHEDULE BRUSSELS TOOL SHOW

BRUSSELS — The Third European Machine Tool Exhibition will be held here September 4-13. More than 2500 machine tools are expected to be shown by some 700 exhibitors from Germany, France, Belgium, Great Britain, Sweden, the Netherlands and the United States. Some 300 German firms alone will exhibit.



BY-PRODUCTS OF MACHINIST TRAINING at Boeing Airplane Co's Seattle plant are (left) sorting bins made from discarded steel templates; these bins retail at $200 each, and (right) metal letter files. In the last year, the school has turned out 11,395 usable items, valued at more than $23,000, in its training courses

Hardage L Andrews

A W Plier

Sherman W Schauer

Gordon W Smithson

Names in the News

Hardage L Andrews, formerly executive vice president of General Electric Co, has been appointed president of Jones & Lamson Machine Co, Springfield, Vt. Mr Andrews succeeds **K Hazen Woolson,** who has retired from the presidency after 33 years' service with the company but will continue to serve as a director and as vice chairman of the board. An employee of G-E since graduation from the University of Missouri, Mr Andrews became vice president in charge of railroad electrification and transportation in 1934; vice president in charge of the Appliance & Merchandise Department in 1939; executive vice president in 1950; and in 1951 retired under G-E's optional retirement plan.

George Bennett, former tool superintendent for Chevrolet Division, GMC, and one-time chief manufacturing engineer for Fruehauf Trailer Co, has been promoted from vice president and chief engineer of the Harold F Howard Co, Detroit, to executive vice president and general manager.

A W Plier has been named president and general manager of the D J Murray Manufacturing Co, Wausau, Wis, succeeding **F C Boyce,** who has been named chairman of the board. With the Murray Co since 1930, Mr Plier was formerly executive vice president and general manager of the company.

Howard D Neal, for the last 14 months general manager of Aerol Co, Inc, Los Angeles manufacturers of wheels and casters, has been named vice president and general manager of the company.

H A Oldenkamp has been named director and **R A Kimes** manager of American Machine & Foundry Co's new development Engineering Laboratory, Greenwich, Conn. Mr Oldenkamp was formerly chief engineer, and Mr Kimes assistant chief engineer of AMF's Brooklyn plant. The Laboratory's development activities will include work on atomic energy, automation, radar, textile machinery, rocket launchers and gun loaders for heavy artillery.

Sherman W Schauer, for the last several years a member of the sales department of Cincinnati Bickford Tool Co, Cincinnati, has been named assistant sales manager. Mr Schauer, who saw service with Army Ordnance in Europe in World War II, is the son of Cincinnati Bickford's vice president and general sales manager, Neil C Schauer.

Gordon W Smithson has been named chief engineer for Potter & Johnston Co, Pawtucket, R I. For the last 17 years, Mr Smithson has majored in the electrical phase of Potter & Johnston machine tool manufacture. In his new position, he will direct product improvement and mechanical and electrical engineering research.

George W Wallace has resigned as vice president in charge of operations, Ferro Corp, Cleveland, but will remain a director of the Corporation.

Edward W Forth, assistant to the plant superintendent at American Machine & Foundry Co's Buffalo Division, has been named assistant plant superintendent for De Walt, Inc, Lancaster, Pa., AMF subsidiary.

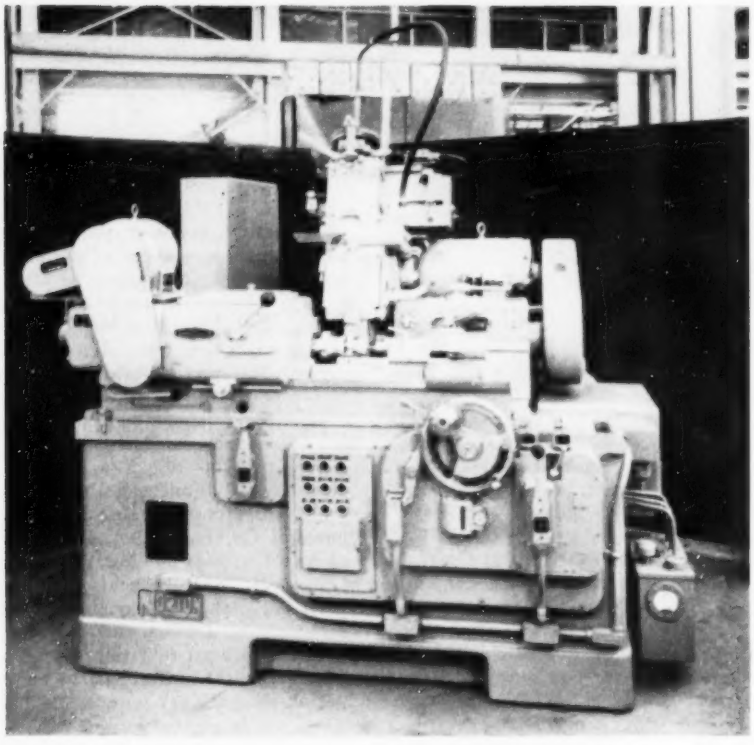
H A Oldenkamp

R A Kimes

Howard D Neal

Edward W Forth

New Shop Equipment



Norton Semiautomatic Piston Grinder Grinds Skirt With Varying Relief

Norton 6x8-in. semiautomatic piston-grinding machine grinds elliptical automotive and aircraft pistons to fine limits of size and finish. Machine can be specially arranged for grinding complex skirts where the degree of relief varies from top to bottom.

Hydraulically actuated revolving-feedscrew wheel feed mechanism provides for rapidly traversing the wheelhead and for mechanical micrometer-screw feed during the grinding feed stage.

Features claimed for the machine are high productivity and simple operation. The automatic grinding cycle is started by a single lever. Wheel truing is done automatically by a wheelguard-type truing device actuated by pushbutton.

All controls for feeds and speeds are grouped on the front of the machine; all pumps, motors, relief valves, and flow control valves are mounted in accessible locations on the outside of the machine; electrical controls are grouped in an elevated enclosure.

Norton Co, Worcester 6, Mass

Electronic Contour Sensor Indicates Own Accuracy

Contour Sensor, made by Aerolab Development Co, consists of the electro-visual sensing head, electronic brain housed in portable cabinet, and Servo drive motor. Reportedly, the unit can be attached to the leadscrew of almost any machine tool.

The contour sensing element is mounted in a conventional dial indicator case and includes micrometer for setting depth of cut and indicator which continuously informs the operator of the accuracy the duplicator is maintaining.

In operation the model is fed against the stylus by normal machine feed and movement of the stylus, sensitive to 0.00002 in., creates signals which are transmitted to the brain, amplified, and converted into power impulses. A high-power, low-speed Servomotor attached to the machine leadscrew (vertical, horizontal, or cross) receives the impulses and drives the table in small increments to follow the changing contour. Indicator needle deflects and returns to zero on each impulse.

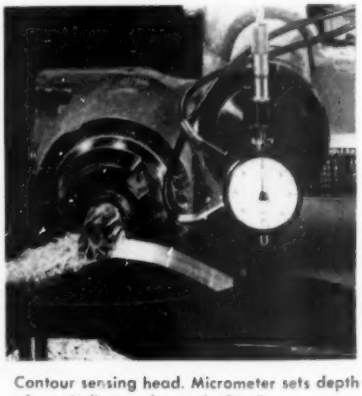
Accuracy is said to be insured because the brain can be set to compensate for worn ways and leadscrews. A graduated dial on the cabinet enables the operator to use the maximum precision of which the machine is capable. In an ideal case, the lower limits of accuracy will reportedly approach 0.0001 in.

The unit is said to be easily set up on mills, lathes, shapers, grinders, and other machines. At the Western Metal Show, it was demonstrated that change-over from milling machine to engine lathe can be accomplished in half an hour.

Other features of the contour sensor include the fact that the stylus pressure may be as low as 2 oz, the power supply is 110-v ac, and voltage variations, continuous or intermittent, do not affect the operation.

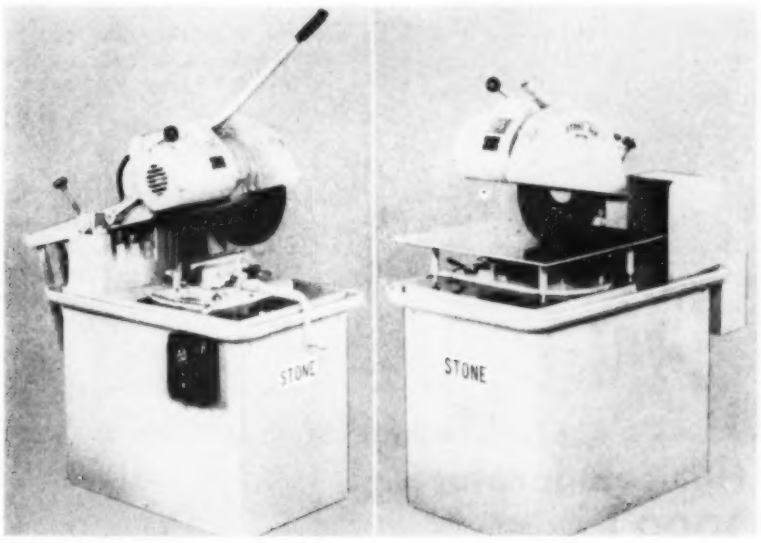
It is claimed that the machine is priced below the normal level for high-grade duplicators.

Aerolab Development Co, 330 West Holly St, Pasadena 3, Calif



Contour sensing head. Micrometer sets depth of cut; indicator shows duplication accuracy.

Materials and Parts



Cutoff Machine Interchangeable From Regular to Freehand

Stone heavy-duty M75 is now available as an interchangeable machine that can be used as a regular cutoff machine or converted in five minutes for freehand cutting of gates and risers from foundry castings.

The machine is shown at left as a regular cut-off machine and at right as setup for freehand cutting. As a regular machine, either abrasive blades or semi-HSS saw blades may be used.

Capacity is 2½-in. solid and 4-in. pipe, tubing and structurals. Machine is equipped with 7½-hp geared-in-head motor. It is reported that machine will cut materials at a rate of less than 4 sec per sq in.

Stone Machinery Co, Inc, 501 Fayette St, Manlius, NY

Michigan Tool Soluble Oil For Coolant-Lubricant

The new Shear-Speed Chemical Products Division of Michigan Tool has developed a versatile soluble oil for use as a coolant-lubricant. Advantages reportedly demonstrated in service include an increase of tool life and less machine downtime. The coolant has a pastel blue color to eliminate harsh glare.

Features include: no objectionable odor, a special additive to protect hands, concentrate pours at low temperatures, stable emulsion over a wide range of temperatures, no special mixing procedure required, rapid emulsification with hard water, no heavy film residue left on parts, anti-fuming and non-smoking under normal operations, high penetration around cutting edge of tool due to low surface tension, inhibits rust of ferrous metals even with dilute emulsions of 200 to 1, and quick separation of fines and chips from the coolant due to its low viscosity.

Dilutions of 10 to 1 and 40 to 1 are recommended for most machining operations, with heavier operations using the lowest ratios. Operations requiring normal cuts use dilutions of about 20 to 1. Where cutting edges are not in continuous contact with the work, such as in gear hobbing and milling, dilutions of 40 to 1 are used. Most grinding operations need dilutions of 80 to 1.

Shear-Speed Chemical Products Division, 7125 E McNichols Road, Detroit 12, Mich

...INCLUDING

Flattening and tempering furnace has temperature range from 350 to 1000 F ... page 178

Horizontal broaching machine automatically broaches external slots or scallops on jet-engine rings ... page 179

Rotating band welding machine for projectiles uses standard head and continuously consumable electrode ... page 180

Dry grinding machine allows all movements, crossfeed, or vertical adjustment of wheelhead to be made by hand or power. page 182

Punch press is equipped with central electronic control system providing both cycling and timing mechanism and dual safety control. ... page 184

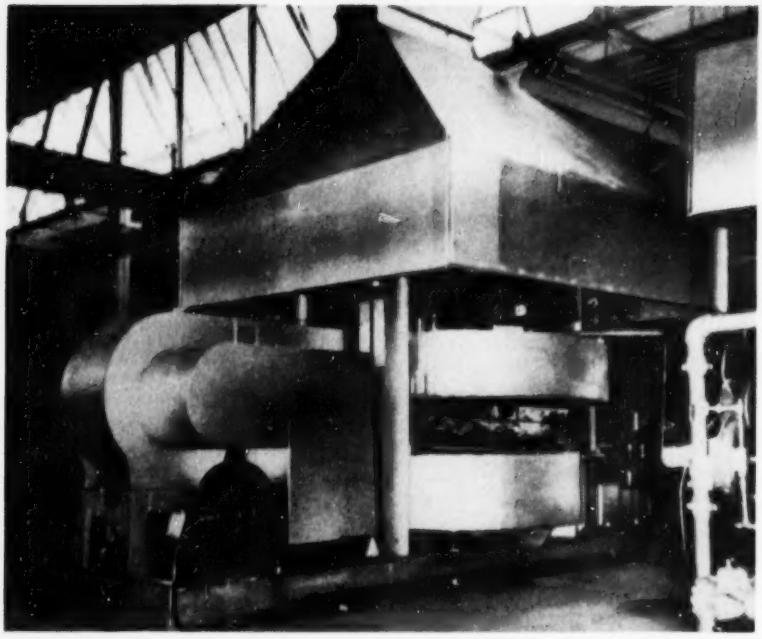
Radial drill features speed and feed preselection for succeeding hole while previous one is being drilled ... page 186

Portable force-metering system will apply calibrated linear thrusts up to 150 tons in any direction ... page 188

...and in July 6

Drilling machine uses hydraulically controlled air power for automatic drilling, tapping, and indexing.

Machine tool locating microscope provides magnification great enough to see 0.0001 in.



Tempering Furnace Has Temperature Range From 350 to 1000 F

Waltz furnace with range from 350 to 1000 F flattens and tempers large thin circular pieces. The unit is gas-fired, recirculating, the burner firing into a combustion chamber on the inlet side of the recirculating fan. Combustion blower and Vickers hydraulic unit are mounted on the base of the furnace. Instruments for controlling and recording temperatures are mounted on the furnace column.

The dies inside the furnace are 76 in. in diameter and the top die is fastened by means of a ball-socket joint to the bottom of the cylinder piston. The bottom die rests on steel supporting structure.

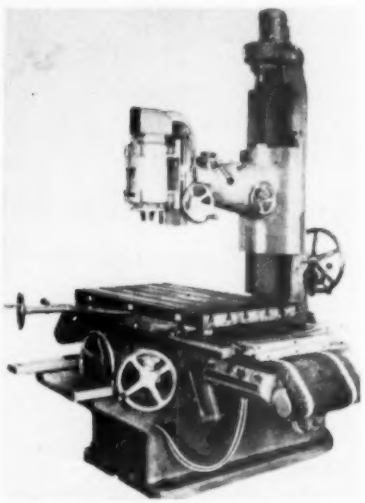
Waltz Furnace Co, 1901 Symmes St, Dept 1, Cincinnati, Ohio

operating controls for cycling and inching, and control for a single work stroke with return of the ram to "up" position.

Design is such that the force is exerted along the centerline of the side frame and directly down to the bed on its supporting leg of the frame. Since the ram and bed are deep and deflections are low, the machine is said to give excellent results when working to close tolerances.

Automatic force-feed lubrication is incorporated. The motor is punch press type, driving the flywheel through V-belts. Removable foot pedal and hand lever allow simplified manual operation and safety pins lock out the controls to prevent accidental engagement of the clutch.

Struthers Wells Corp, Machinery Div, Titusville, Pa



Patternmakers Milling Machine Handles Work to 8½-ft Dia

Bokoe Model 2 has large worktable and deep throat for machining ferrous, non-ferrous, and wood. Manual controls provide for 28-in. traverse and 48-in. longitudinal movement. With automatic feed, longitudinal movement is variable from 3 to 58 in. Max dia of turntable work is 8½ ft. Depth of throat between column slide and spindle center is 35 in. A wide range of settings and adjustments, as well as spindle speeds, are provided. The variable speed changer can be operated without stopping the machine. In addition to normal operation as a milling machine, the unit can be used as a radial drill.

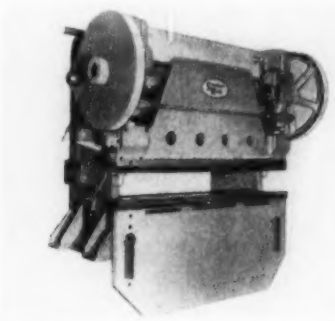
Machines are designed for standard American voltages and frequencies; lead-screws are in inches.

Imported by Kurt Orban Co, Inc, 205 E 42nd St, NY 17, NY

du Mont Combination Keyway Broach Kit

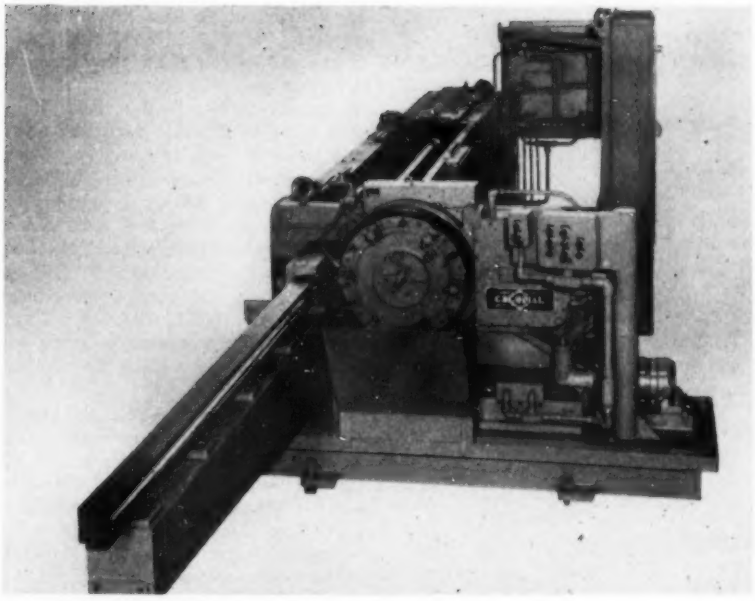
Combination kit provides broaches and bushings for standard-width keyways in eighteen bore diameters conforming to American key standards. By interchanging broaches and bushings, 36 different combinations of keyways can be cut.

The du Mont Corp, Greenfield, Mass



Struthers Wells Press Brake Has 400-Ton Capacity

Model 400-PB-8 press brake has 400-ton capacity and will form steel up to ¾ in. in thickness and 8 ft in width. The machine affords the operator complete control at all times, with instant stopping of the ram at any point. It is provided with pneumatic clutch and separate brake,



Colonial Horizontal Broaching Machine For Jet-Engine Rings

Horizontal broaching machine for automatic broaching of external slots or scallops on jet-engine rings are basically standard 10-ton, 60-in.- and 10-ton, 90-in.-stroke horizontal machines. The smaller machine broaches three scallops with each pass of the ram. The other broaches a single dovetail slot with each stroke. Fully automatic, the work shuttles into the cut and the ram starts. At the completion of the stroke, the fixture recedes from the broach cut and the ram returns to starting position.

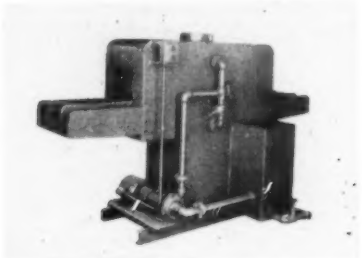
The part is then automatically indexed one increment and the process repeated. The fixture automatically recedes to loading position. Pneumatic or mechanical ejection for the finished part is optional.

Hydraulically actuated shuttle movement, which slides on the base using box-type square gibs, is mounted low to allow handling of large-diameter work. Positive mechanical locking is provided to secure work.

Indexing, hydraulically driven, is through change gears and Geneva movement, controlled by limit switches, and with positive plunger locking. Selective electrical circuits are provided for fully automatic operation, single indexing, or independent inching motions, including forward and reverse.

Machines are so constructed that they may be shipped in three separate subassemblies and assembled in the production shop.

Colonial Broach Co, PO Box 37, Harper Station, Detroit 13, Mich



Power Washing Machine For Small Parts

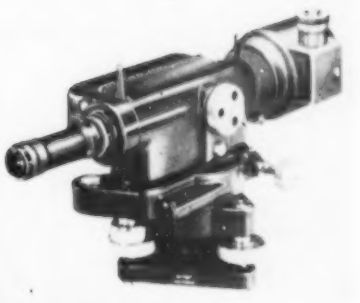
Power washing machine, designed for low production jobs, or cleaning between operation, has been introduced by G S Blakelsee.

Unit, tank, and tables are so arranged that two units can be teamed together for wash-and-rinse operation. Machine is equipped with wheel roller conveyor.

Unit can be furnished with special Niagara Paddle Wheel instead of a pump, said to be particularly adaptable for screw machine work where a large amount of chips has to be removed, and operation calls for a large solution volume at a low head.

Can be furnished for steam, gas, or electric heat, and in explosion-proof construction for use with petroleum solvents.

G S Blakelsee & Co, Chicago, Ill

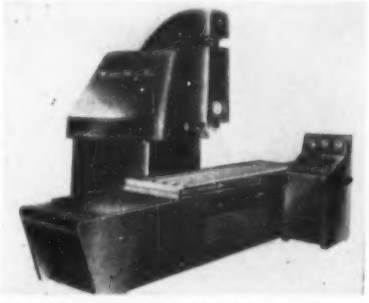


Level Has Built-In Micrometer; Direct-Reads to 0.001 in.

Microptic level B131A is designed to determine whether points in large fixtures or in machinery lie in a level plane; optical micrometer indicates leveling errors independent of distance.

Built-in precision level is split-bubble type; telescope has erecting eye-piece; graticule is equipped for both scale and target reading. Optical micrometer reads directly to 0.001 in. over a range of 0.25 in. Leveling rods of 3- and 6-ft. lengths, as well as special scales, are available as accessory equipment.

Engis Equipment Co, 431 South Dearborn St, Chicago, Ill



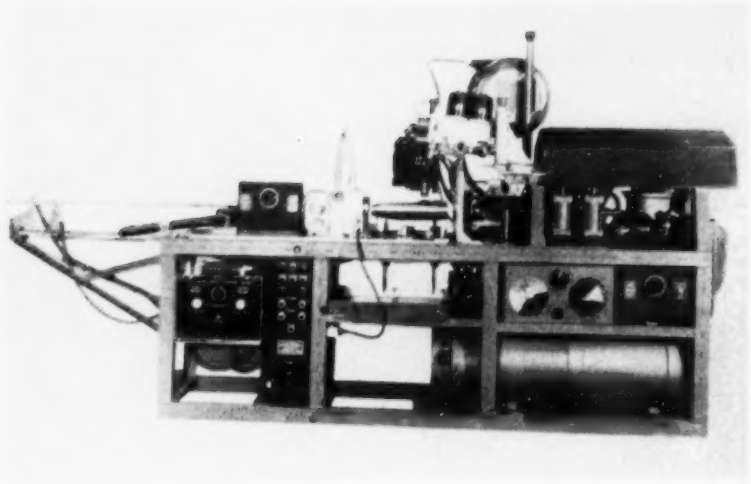
Hydro Micro-Tel Machine Has Automatic Leveling Device

Hydro Micro-Tel vertical tracing, profiling, and milling machine is being marketed by De Witt Lewis.

Air-hydradyne jacks and sensitized support automatically level the table and maintain level with the removal of metal. Automatic gib devices lock by the air hydradyne system, and must be released by a dial before they can be moved. Desired pressure can be exerted on the gibs while in movement to give closest possible tolerances.

Machine is said to be capable of hydraulic tracing accurate to 0.001 in.; electronic tracing or profiling accurate to 0.0002 in. Unit has spindle selective power feed and depth control to 0.0001 in.

De Witt Lewis Co, 3629 Sophia St, Wayne, Mich



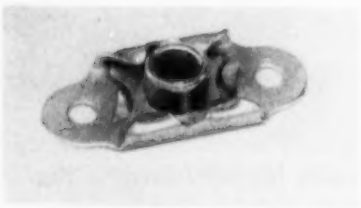
Rotating Band Welding Machine For Projectiles

Morley Model F universal rotating band welding machine makes use of a standard welding head using a continuously consumable electrode. Rotating bands can be applied by either spiral or index feed while the shell is rotated between self-centering chucking adapters. The welding generator is incorporated in the frame of the machine.

Machine can be used to increase diameter of cylindrical parts.

Compressed air or water cooling of the work is provided through a cooling tube synchronized with the welding head. Automatic loading and unloading features make the machine suitable for production work.

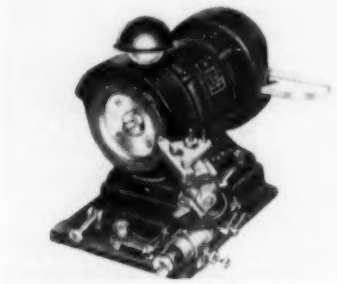
Morley Machinery Corp, 1239 University Ave, Rochester 7, NY



Two-Lug Floating Anchor Nut

Kaynar F-5000 series two-lug floating anchor nuts include 10-32 and ¼-28 tap sizes. Produced from spring steel, the line is claimed to be the strongest anchor nut made. They possess full 1/16-in. radial float to eliminate alignment problems. In the 10-32 tap size, the torque-out values are in excess of 80 in.-lb and push-out values in excess of 400 lb. In the ¼-28 tap size, torque-out values are in excess of 120 in.-lb and push-out values in excess of 500 lb. Nut can be used in applications up to 555 F. Parts are normally cadmium plated.

The Kaynar Co, 820 E 16th St, Los Angeles, Calif



Precision Grinder Available At Moderate Price

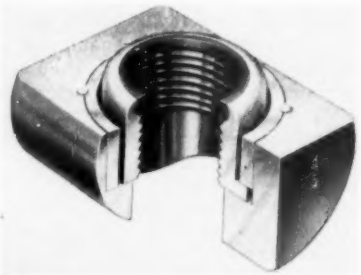
Moderately-priced precision grinder has been introduced which is said to produce perfect keen cutting edges and exact angles on all types of modern cutting tools, such as carbide, stellite, and high-speed steel.

Tool is rocked back and forth across entire wheel face, eliminating scoring and grooving of the wheels and greatly increasing life. All front, side, and top angles can be set precisely, in both vertical and horizontal planes. Feed of tool toward grinding wheel is accurately controlled by a micrometer feed knob, graduated in thousandths of an inch.

One side of the grinder is equipped with an indexing table which can be accurately set to the right angle and remains fixed in position without need of locking devices. Tools can be rapidly rough-ground by hand on a vitrified wheel to a slightly greater angle than the final finish angle; only a slight amount of grinding is then necessary on the finishing wheel, using the precision reciprocating-action toolholder, to obtain exact angles, straight edges, and perfect finish. Wheel can be vitrified or diamond.

Model AP is available in bench and floor types, for either wet or dry grinding. Prices range from $274.50 for the bench machine and $369 for the floor type, up to $547 for the wet type floor machine, equipped with a separate motor-driven coolant pump and accessory equipment, to furnish flow of water directly to the tool being ground.

Thomas Prosser & Son, 120 Wall St, New York, NY



Self-Aligning Barrel Nut

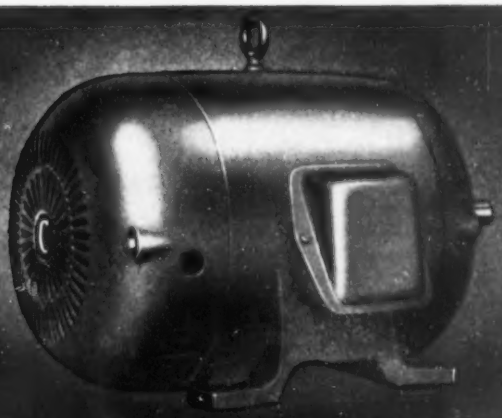
Shur-Lok self-aligning barrel nut has self-locking feature. Designated Series SL6, the nut is designed for application where highly concentrated loads are encountered.

The nut is made in three pieces: a 75ST6 aluminum barrel; a threaded steel bushing; and a steel retainer. Ears on the base of the threaded steel bushing float in the slotted section of the retainer, provide the self-aligning feature. The knurled retainer is pressed in place and punch-staked at four places. Shape of the lightweight barrel distributes the load carried by steel threads of bushing into surrounding structure.

Installation procedure consists of reaming a hole in the structure, inserting the barrel nut into the hole, and snapping a retaining spring into the hole behind the nut.

Nut is manufactured with internal thread sizes from ¼-28 to ⅞-14.

Shur-Lok Corp, 9010 Bellanca Ave, Los Angeles 45, Calif



The Protection of Century Type TEFC* Motors Keeps Production Rolling

Your Maintenance Man.. who must keep your Production Turning, knows how to evaluate the inside of the Motor. Ask him about these Century Construction features.

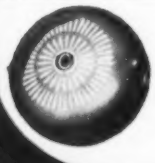
Century type TEFC protected type motors are very popular in the chemical and food processing industries for resisting rust and corrosive fumes. They are widely used in the metal working industries to protect the vital parts against abrasive dust or gritty oil fog.

Specify Century motors on the motorized equipment you purchase, or call a Century branch office or a Century distributor when you purchase motors. Century manufactures a complete line from ½ to 400 H. P.

- Vital parts of motor protected — sealed-in inner frame.
- Reverse direction of motor without changing fan — Fan runs in either direction.

- Uniform ventilation — surrounding outside of inner frame.
- Smooth straight-through ventilating passages.
- Winding electrically insulated 6 different ways.

- Uniform rotor winding — high pressure cast aluminum.
- Ball bearing housing keeps grease "in"—dirt "out"—lubricated for several years' normal service, with grease plugs when you want to lubricate bearings.



- Easy to remove fan guard for inspection—2 screws hold steel fan guard in place.

Century C MOTORS

CENTURY ELECTRIC COMPANY
1806 Pine Street · St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

English Grinding Machines

Scrivener line of English machines distributed here by Kelvin Systems includes centerless grinders, duplex grinders, surface grinders, and an end-forming machine. Illustrated is the 8x18-in. Super-Surface grinding machine, model 9102/2. This unit has a nitralloy spindle with built-in adjustment for wear.

The table takes a full-size vise, and all movements, crossfeed or vertical adjustment of the wheelhead, can be effected by hand or power. Wheel-dressing device is included as standard equipment, permitting dressing without disturbing the work.

Power rise-and-fall operates to half an inch of the total rise, at which point a limit switch is operated, cutting out the power feed and leaving the column to be manually operated.

Unit is normally supplied for dry grinding, but accessories are available for wet grinding.

Imported by Kelvin Systems Corp, 135 Front St, NY 5, NY

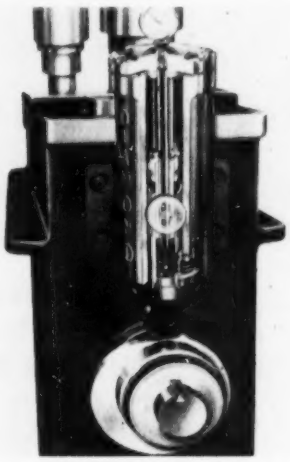
Carbide-Tipped Tool Line

Ariel carbide-tipped boring tools are of one-piece construction for greater rigidity and elimination of chatter; need only a toolpost wrench to tighten in operation.

Flat base from which to position the tool makes it simple to grind. The back of the rectangular holder, tapered shank, and tip holder are in a straight line; when this is lined up with the machine, clearance for entire bar's length is assured.

Company's line of carbide-tipped products includes: tools for small metal-turning lathes; units for toolpost turrets, to obviate altering a square toolbit; deep-boring bars to fit in standard holders; offset tools for extending normal boring capacity of boring heads 2¼ in. diametrically; jig boring tools for ½- and 1-in. heads; special tools from sketch.

Ariel Products Co, 4050 W 123rd St, Blue Island, Ill



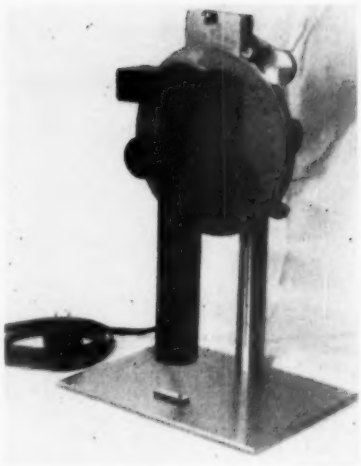
Pneumatic Clutch Equilibrator Removes Load at Disengagement

Diamond Machine Tool's line of Multi-Max punch presses and shears is now being equipped with a new clutch equilibrator.

The two-part unit consists of a heart-shaped cam and an air chamber with an automatic pumping and regulating mechanism. This development, as used on punch presses, counterbalances the punch and die plates which vary from one setup to another, acts as a frictionless brake, and removes all the load from clutch assembly at the time of disengagement.

Cam is installed on the crankshaft and secured to the face of the brake drum; roller rides on cam surface, counterbalancing the ram weight. At upstroke of ram, roller pressure rotates crankshaft approximately 5° ahead of the bull gear wheel. At point of clutch disengagement, this pre-rotation eliminates all drag and pressure on the length of the clutch dog, permitting engaging and disengaging operations to be performed with extreme ease.

Diamond Machine Tool Co, 5111 Coffman-Pico-Rd, Pico, Calif



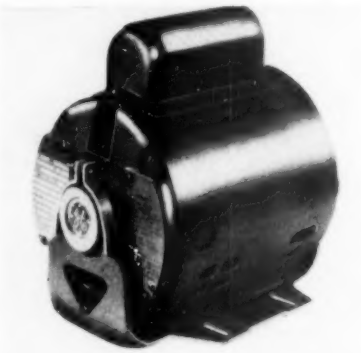
Angle Setting and Checking Collimator

Mitchell unit sets angles to 30 sec of arc or, by transference from a sine bar, to as little as 5 sec. According to the manufacturer, the outstanding feature is its low-cost ($180).

The device can be used for such applications as measurement of internal and external angles, tapers, cones, valve seats, parallelism, and right angles, as well as checking the straightness of surface plates and machine beds to fractions of 0.0001 in. per in. length.

Black plastic materials have been used for all possible parts and the dial and vernier machine were made by semi-production techniques.

Mitchell Scientific, 39 MacQueston Parkway North, Mt Vernon, NY

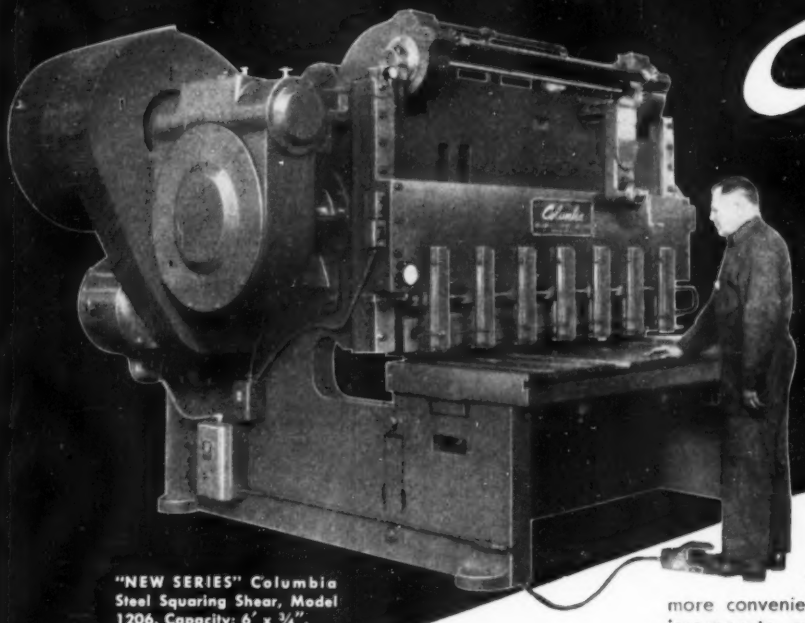


SPECIAL-SERVICE MOTORS for applications requiring moderately high starting torque are rated at ½ and ¾ hp, 1725 rpm. Can be mounted in any position, and are easily reconnectable at the terminal board for 115/230 v. Units are smaller and lighter weight than corresponding general purpose ratings—*General Electric Co, Schenectady, NY*

5315

MAKE NO MISTAKE about it

Columbia builds BETTER shears!



"NEW SERIES" Columbia Steel Squaring Shear, Model 1206. Capacity: 6' x ¾".

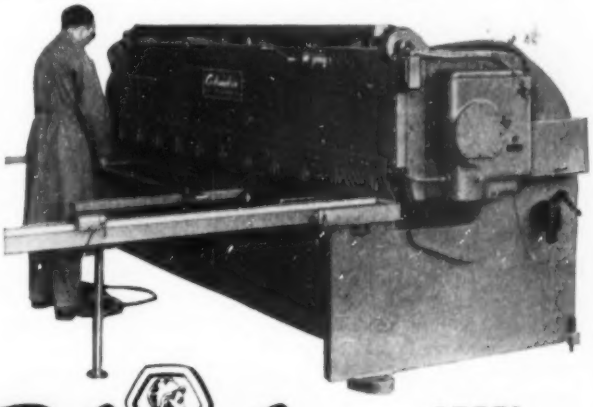
"NEW SERIES" Columbia SHEARS are more convenient in operation, more accurate and safer; incorporate more stamina, have a greater production potential. Consider that fact; and its implied benefits of longer tool life, easier maintenance, fewer repairs, more production, less scrap, fewer accidents!

AS A QUICK EXAMPLE of Columbia's better design take a look at the Columbia exclusive air clutch.

- ★ It reduces gear wear by as much as 75% through elimination of gear movement except in actual cutting cycle.
- ★ Application of power is soft. Shocks are not transmitted.
- ★ Inherent clutch slippage at overload point acts as automatic cut-off.

AND THE DESIGN IS RICH with parallel advantages. Such as the exclusive hydraulic holddown finger connections which contribute so much to the ease of holddown system maintenance; the special slitting provision which extends the capacity of the bed; the blade clearance setting gage, which makes blade clearance setting an "operator function."

Other capacities from 6' x 3/16" to 6' x 1¼", 12' x 1", 14' x ¾", or 20' x ⅜" in mild steel.



DON'T FOLLOW BLIND PRECEDENT in the selection of your new shear. Don't risk the purchase of anything less than a modern Columbia tool. For the price is standard and delivery is often better.

FULL PARTICULARS WILL COST YOU only a minute of your time and the few cents required to mail your request. Don't delay! Even though your purchase of a shear may be a year or more away! Get the information now, and have it at hand when the need becomes urgent.

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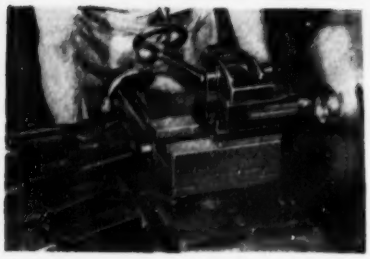
new series **Columbia** STEEL SQUARING SHEARS and POWER PRESS BRAKES

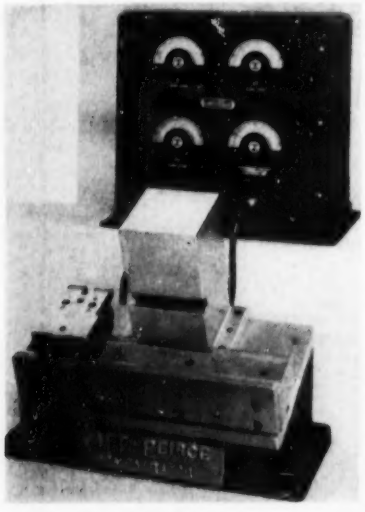


Toolpost and Holders

Bakewell master toolpost and toolholders reportedly cut setup time in half. The post is secured to the lathe by a T-block which fits into the T-slot of the compound or carriage. Simple riser plates for vertical spacing are said to quickly adapt it to any lathe.

The bar-type toolholder is held in the toolpost by hardened and ground jaws. Rotating the handle cw releases the extreme pressure on the jaws; further rotation engages a cam causing the jaws to open fully. When tightening the holder, 10-lb pressure on the handle exerts 6200 lb of jaw pressure. One corner of the toolholder is chamfered 45° so that the toolholder is held against three sides of the toolpost.

Bakewell Products, 1128 Mission St, South Pasadena, Calif



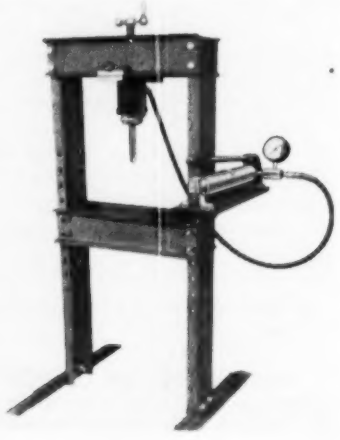
Taft-Pierce Air-Operated Inspection Gage

Air-operated inspection gage measures the dimensions over rolls of serrations in the root section of jet engine turbine blades. The gaging fixture is made with tungsten carbide contacts, precision ground to a radius corresponding to the required roll dimension. These contacts are mounted on parallel reeds so they are free to move both vertically and horizontally. This permits the measuring contacts to position themselves correctly, regardless of any permissible lead variations that may exist in the serrations.

Three indicators, with dial graduations of 0.0001 in., show dimensions as measured over rolls on each of the three serrated sections. In addition, the unit incorporates a fourth indicator to compute the difference between the amounts that each of two dimensions varies from its mean value. The inspected part is rejected whenever the computing indicator shows this variation to be greater than plus or minus 0.001 in.

Two of these air gaging units have been built. The first is designed to allow the grinding machine operator to gage the part while it is still in the grinding fixture. The second unit is used as a final inspection gage.

Taft-Pierce Mfg Co, Woonsocket, RI



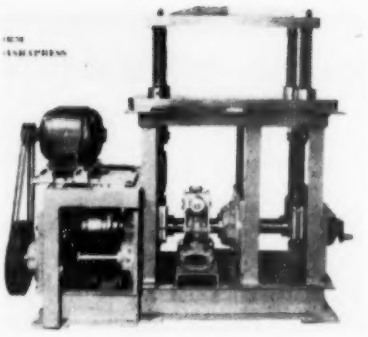
Hydraulic Shop Press

Inexpensive hydraulic shop press, capable of developing 17½ tons, is being marketed by Owatonna Tool Co.

Model Y106A is equipped with the Power-Twin ram which can be detached from the press and used as a portable power unit. It can be easily attached to the company's Grip-o-matic Pullers and Push-Pullers for field or shop maintenance operations, and can be used as a lifting jack as well.

Press is furnished with hydraulic hand pump which develops 10,000 psi; a 6-ft-high pressure hose connects pump and ram. A 15,000 psi gage is supplied to indicate actual pounds or tons pressure used.

Owatonna Tool Co, 383 Cedar St, Owatonna, Minn



Punch Press Is Equipped With Central Electronic Control

DBM DASHapress is equipped with a central electronic control system which provides both a central cycling and timing mechanism, as well as a dual safety control. It is said to be the first system of its kind available which provides instant stoppage of the machine if the safety device should fail to function.

The 25-ton-capacity punch press has 21¾ x 9¾-in. platen areas permitting wide diversification of application. Material can be fed into machine from any of the four sides in strip or cut form, making it particularly adaptable to parts requiring a large die area.

The 4 ft. 6 in.-high unit operates at the rate of 90 to 120 strokes per minute and is equipped with a double undercrank pull-down drive, and single revolution or continuous clutch. Variable shut die heights and ranges are available to meet user requirements.

Dashew Business Machines, Inc, 1641 McGarry St, Los Angeles, Calif

Lightweight Demagnetizer

Jiffy-Rase demagnetizes metals and tools which have picked up filings and drill shavings.

Portable, lightweight unit can be plugged into any 110-v ac socket, placed over object to be demagnetized, moved over the surface, and shavings fall off. Housed in a polished aluminum case, equipped with a momentary on-off switch, and a rubber-covered line cord.

Rason Manufacturing Co, 3050 W 21st St, Brooklyn, NY

HY-PRO TAPS HAVE SPECIALIZED ENGINEERING!

...they can help you cut production costs

At Hy-Pro we concentrate our operation on the manufacture of taps. This enables our engineers to continually focus their work on the design and production of this one important line. The result has been Hy-Pro's earned reputation as a specialist in all tap needs.

This experience is at your service. Our engineers are always ready to assist you in every way—from advising on a particular job to helping in your regular production setup.

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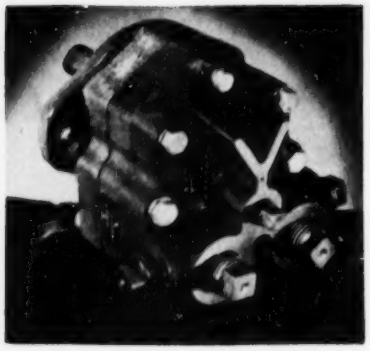
CHICAGO, ILL.
Newcastle 1-6486



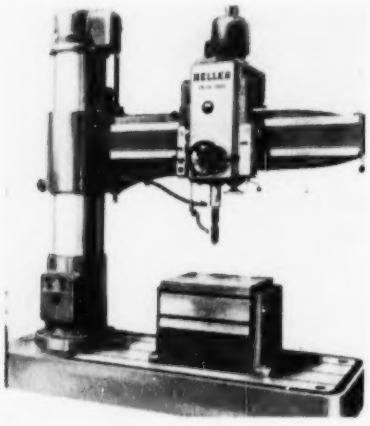
Webster Adds Gear Pump Models

HC series of gear-type pumps has been added to Webster's hydraulic pump line. Models are available in three sizes with capacities ranging from 5.4 to 10 gpm at 1800 rpm and pressure of 1000 psi. Designed for operation in selected applications requiring higher pressures or greater speeds, the units will pump most liquids having a substantial oil base.

Shaft design permits pumps to be direct-, gear-, or belt-driven. Wide selection of porting locations is available; end or side porting is standard.

Units may be furnished with an internal relief valve permitting regulation of pressures between 500 and 1200 psi, but cannot be used as a control or pressure regulating valve.

Webster Electric Co, Oil Hydraulics Div, 1900 Clark St, Racine, Wis



Heller Radial Drill Has Speed and Feed Preselector

RB series of Heller radial drills will drill up to 2½ in. from solid, at any of 12 spindle speeds from 33 to 1500 rpm.

Vertical drill-motor is reversible, operating at 1800 or 3600 rpm. Motor, 3 to 5½ hp, depending on model, drives spindle through multiple-disc clutch, sliding gear train. Gears are hardened and ground.

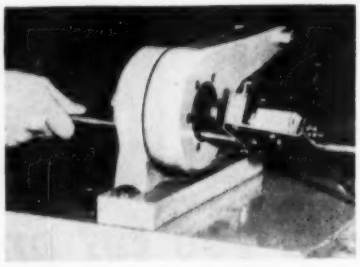
Preselector gear changing permits the operator to select the spindle speed for the next hole while the previous one is being drilled. As the gear-change lever is depressed, brake control stops the motor, and gears change to preset position. Releasing the lever starts the spindle at the new speed.

Feeds are set on a selector disc, and can be changed while the machine is in operation.

Depth is controlled by an electric switch and magnetic clutch which stops the feed when desired depth is reached. When tapping, operator sets a selector switch, and tap is automatically reversed when it reaches proper depth.

Clamping of the radial arm, column sleeve, and saddle are hydraulic, and machine will not operate unless all clamps are actuated.

Imported by Heller Machine Co, 114 Liberty St, NY 6, NY



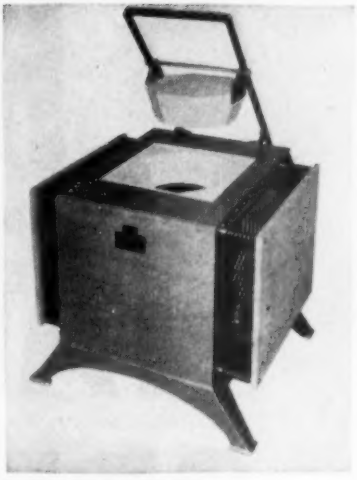
Micro-matic Gage for Use With Di-Acro Power Rod Parter

Micro-matic gage makes it possible to maintain in excess of 9000 cuts per hour in bar stock with the Di-Acro power rod parter. The operator sets the gage for the desired length of cut, inserts the material in the proper hole in the cutting heads (there are ten hole sizes accommodating stock from 1/16- to ⅝-in. dia) and pushes the material through the heads flush against the Micro-matic gage. The contact thus made is relayed to a solenoid which trips off the cutting action and also allows the cut part to be ejected.

Rate of production is governed to a certain extent by the lengths of stock to be cut. Shorter lengths can be cut faster than longer lengths.

The standard Di-Acro power rod parter is set up for cutting round stock. Special rod parters for cutting square, rectangular, hexagonal and other shaped bars are also available. Cost: $95.00.

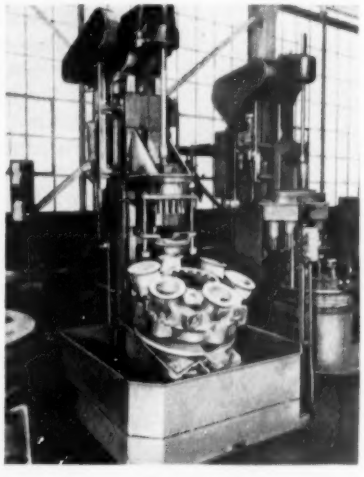
O'Neil-Irwin Mfg Co, 512 Eighth Ave, Lake City, Minn



Sentry Electric Furnace Operates at 2500 F

Sentry electric furnace model YV was designed for laboratory and shop operations requiring the melting of small crucible charges of metals and alloys. A cylindrical muffle chamber is incorporated to reduce the tendency of fumes to shorten heating element life. Provision is also made for venting fumes through the closed door. Heating is accomplished by four silicon-carbide-rod-type resistors operating on 220 v. Temperature control is maintained by automatic pyrometer control equipment.

The Sentry Co, Foxboro, Mass



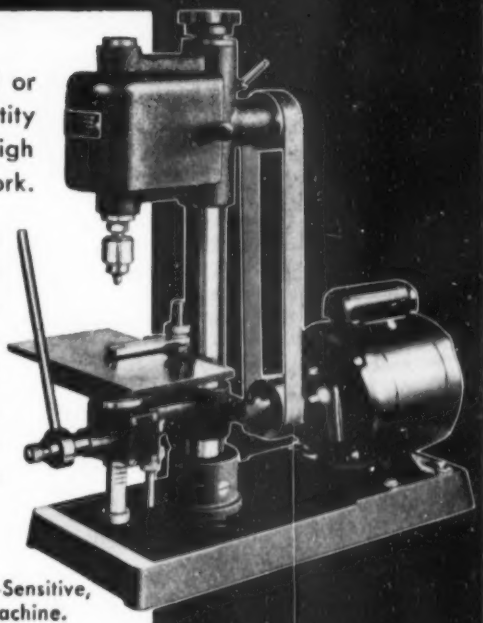
CANADIAN 14-SPINDLE HYDRAULIC DRILL drilling 12 holes and drilling and counterboring 2 holes in each of six flanges on a jet-engine casting. Drill column is model VDH Drillmaster with geared drive head. On machine base is six-station index table. Drive is 10 hp—*Standard Machine & Tool Co, Windsor, Ontario*

YOU CAN DRILL OR TAP TINY, PRECISION HOLES . . . ON A *PRODUCTION* BASIS . . . WITH *MINIMUM* SCRAP AND *MINIMUM* TAP AND DRILL BREAKAGE

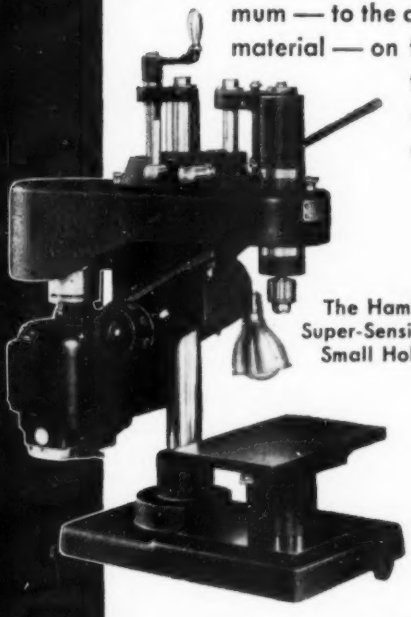
BUT YOU MUST FIT THE TOOL TO THE JOB

When your job calls for tiny, precision holes, drilled or tapped, rely on this; such holes can be produced in quantity and within allowed tolerances only on super sensitive, high precision machines **designed and built** for this class of work.

HAMILTON Drilling Machines and Tapping Machines are super sensitive and extra accurate; **designed and built** for the production of tiny, precision holes. The drilling machines produce holes **up to** 0.3125" maximum — to the center of 10" — in **any** drillable material — on fast production schedules. The tapping machine is designed to use the smallest and finest tap and **up to** 10-32 inclusive.



The HAMILTON® Super-Sensitive, Small Hole Tapping Machine.



The Hamilton VARIMATIC® Super-Sensitive, Variable Speed, Small Hole Drilling Machine.

Multiple spindles also . . .

Acquaint yourself with Hamilton Super Sensitive, Small Hole Drilling and Tapping Machines and be ready for the challenge ahead. Ask for our FREE Bulletin DT-5308.

THE Hamilton TOOL COMPANY

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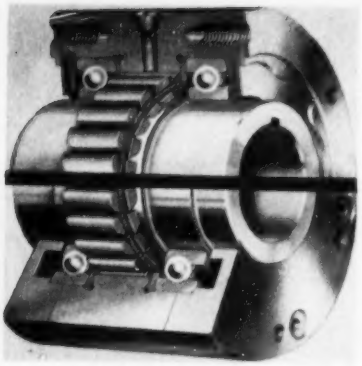
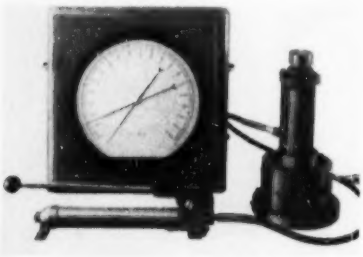


Formsprag Clutch Development

Centrifugal throwout sprag assembly eliminates any possible rubbing between sprags and inner race and makes it possible for over-running clutches to operate at speeds exceeding 3000 rpm. This new feature is available in the Formsprag all-purpose ball bearing clutch—a standard model with eight possible variations.

Construction of Formsprag clutches consists of only four basic parts: outer housing, inner race, full complement of sprags, and energizing springs. The sprag principle provides an infinite number of gripping positions and eliminates backlash. Maximum torque capacity and long life because of changing contact points are other advantages claimed for the sprag type of clutch construction.

Formsprag Co, 23601 Hoover Rd, Van Dyke, Mich.



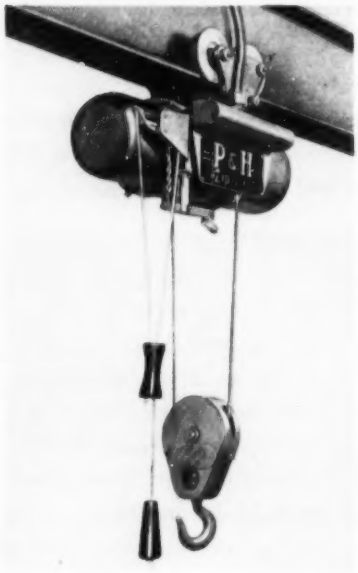
Emery Portable Force-Metering System

Calibrated linear thrusts up to 50 tons in any direction can be applied with the portable force metering system developed by Emery. The new unit precisely weighs the force as it is applied. The force is exerted by a hydraulic jack, mounted on a high-precision Emery hydraulic cell. The output of the cell is connected to a load indicator which reads the load in lb, kg, or any arbitrary units desired. The unit is completely portable. It does not require a special foundation, compressed air, or electric power.

Four cell sizes and three indicator sizes permit the choice of the most efficient system. Emery stocks indicators in 8½-, 12-, and 16-in. sizes, and calibrates them in 24 ranges from 0-500 to 0-100,000 lb. Indicator can be mounted in a protective case as shown or bolted directly to the cell.

Emery guarantees that the accuracy of each unit will remain within 0.25% of full scale.

The A H Emery Co, New Canaan, Conn



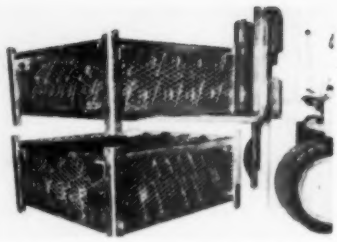
Low-Cost Model of Zip-Lift Hoist Available

Low-cost model P&H Zip-Lift electric hoist with one-hand rope control has been brought out by Harnischfeger.

New unit is guaranteed to operate continuously during intermittent usage for a period 25% longer than the rated time limit, and is said to have a weight-overload safety factor of five times the rated capacity. Model is equipped with standard P&H features, such as double brakes, oil bath lubrication, fully enclosed construction, and grease-packed motor bearings.

Available in two models with lifting capacities of 500 and 1000 lb; hoisting rates are 25 and 13 ft per minute; both can be had with 12-ft and 18-ft lift. Price, $199.50

Harnischfeger Corp, 4400 W National Ave, Milwaukee, Wis



Morrison Stak-Box's Tapered Design Permits High Storage

Morrison Stak-Box has been designed to speed job operations by moving inventoried quantities of parts in the units with a crane, fork lift, boom truck, or dollies. Boxes can be stacked as high as space and materials handling equipment permit.

Boxes are constructed of heavy, formed steel frames with sides and bottom of sheets of 9-gage, unflattened, expanded steel for maximum strength and load capacity combined with relatively light weight. Units are 50 in. square at the top, 49 in. square at bottom, with a 24-in. overall height; tapered frame insures safe stacking. Each box will accommodate up to 7000 lbs. Heavy hook plates at corners provide convenient method for lifting with a crane.

Morrison Steel Products, Inc, 601 Amherst St, Buffalo, NY

Portable Rivet Cooler

Refrigerator for aluminum rivet storage has been added to Ace Cabinet products. Self-contained unit utilizes a ½-hp condensing unit. Thermostat controls temperatures from 100 F in less than three hours to 48 lb of aluminum rivets—unit capacity.

Forty-eight individual canisters and six canister racks store rivets centrally in refrigerated storage compartment. Automatic refrigeration system will maintain a rivet temperature as low as 30 F if desired. Dimensions of unit are 40¾ in. high, 38⅝ in. long and 35½ in. wide.

Ace Cabinet Corp, National Sales Office, 1457 Broadway, New York, NY

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FROM AN AIRCO OXYGEN PLANT?

Look at the map. Every pin locates an Airco plant producing high-purity oxygen for your use. These 71 plants, plus their storage facilities and their fleet of delivery trucks, provide a dependable and flexible supply for your peak and emergency oxygen needs.

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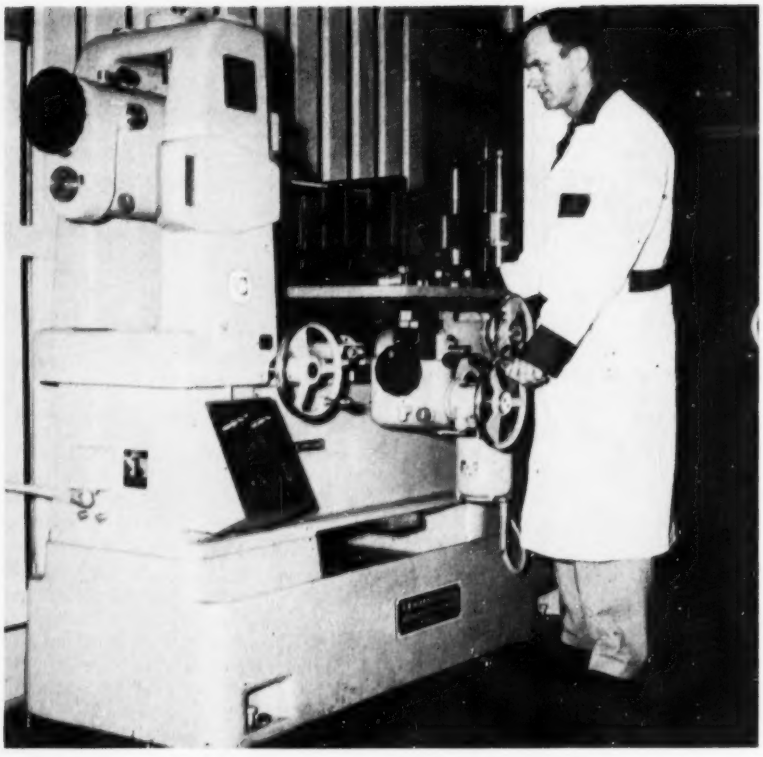


Kearns Optimetric Horizontal Boring Machine For Tool Room

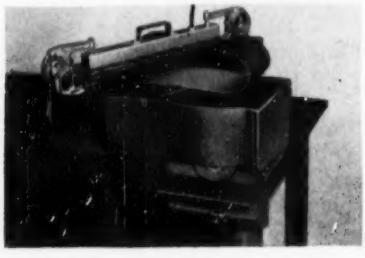
Tool room and experimental work is said to be more easily and quickly handled with type "S" horizontal boring machine. An optical system of measuring coordinates of both spindle and table eliminates mechanical set blocks except for calibration. Optical dials are designed to read to 0.001 in., accurate to ± 0.00025 in.

The spindle is driven by a 1½-hp motor, speeds from 80 to 1000 rpm. Spindle is adaptable for boring bars, milling cutters, facing tools, and drills.

Two models are offered, one with facing chuck adjustable while spindle is in motion, the other with fixed spindle.

Accessories include hand-driven circular table and coolant fittings.

Imported by British Industries Corp, International Machinery Div, 154 Duane St, NY 13, NY



Econaway Abrasive Belt Splicer

Unit designed to increase speed of abrasive belts, improve quality of splice, and allow larger saving in cost of abrasive belts. Improvements include: enclosure for motor, belt drive and wheel arbor; cutter and press bars mounted on top of the enclosure; electrical curing press to reduce curing time from 24 hr to less than a minute.

Accessibility is provided for occasional oiling and greasing of the motor and ball bearing arbor and for dressing the wheel. The electric heater (250-watt Chromalox element) is controlled by a Fenwell adjustable temperature thermostat. Both are enclosed in the upper press segment and removable for inspection.

Aget-Detroit Co, 130 Main St, Ann Arbor, Mich

Heavy-Duty Filters For Air Lines

Heavy-duty filters remove water and oil from compressed air lines. Tested for 500 psi, these filters have a steel outer shell 6 in. in diameter and 36 in. long and a steel inner cartridge 24 in. long and 5 in. in diameter. The inner cartridge has a removable, perforated bottom disk. A cast bronze head with inlet and outlet openings is bolted to a flange welded to the outer shell, and the cast head overlaps the flange to provide for additional pressure. The inner cartridge is packed with Fiberglas.

An alternate model has an 8-in.-dia steel jacket to permit flow of cooling water around the outer shell.

Air-Line Engineering Co, 198 Wayne St, Mansfield, Ohio

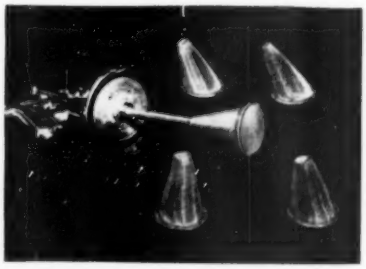
Reynolds Metals Casts Aluminum Plates and Bars

Thick cast aluminum plates and bars, precision-machined to high finish and flatness for tool and die use, are available from Reynolds. The product is said to be especially suited to construction of hydro-press form blocks, hydro-stretch form dies, jigs, fixtures, and other tooling. It replaces Kirksite dies.

The plates are reported to have fine molecular grain structure, high tensile strength, high surface finish (32 mu-in.), and flatness (plus or minus 0.005 in. or less). They will be available in standard width of 48 in. and three standard lengths of 96, 120, and 144 in. and thicknesses from ½ to 8 in.

Completely machined bars will be available up to 8 in. wide, 8 in. thick, and 12 ft long.

Reynolds Metals Co, 2500 S Third St, Louisville, Ky



PAINT SPRAY GUN STRAINER of fine-gage brass screen slides over intake tube. Four sizes are available. Filter is cleaned with gun—*Clear-flo Strainer Co, 8050 35th Ave NE, Seattle, Wash*

GORTON *Brings You* High Production

Automatic Profiling of CAMS AND CAM-LIKE SHAPES

Gorton Contour Mill, CM-12, Produces Extreme Accuracy and High-Surface Finish with Minimum Maintenance

This machine produces highly accurate, identical pieces — complicated cam shapes, external or internal, or continuous grooves and slots of irregular radii. The Gorton Contour Mill is easy to use and versatile — a simple tracer-controlled, vertical-head milling machine with two rotary power-driven tables. No complicated electronic, hydraulic or pneumatic controls.

CAPACITY . . .

Wide spindle-speed range — 300 rpm to 10,000 rpm — for either high-speed steel or carbide cutters, burrs or grit grinding wheels. The 16-inch master-copy table easily accommodates larger master cams. Several thin cams can be stacked and profiled at once.

EXTREME ACCURACY . . .

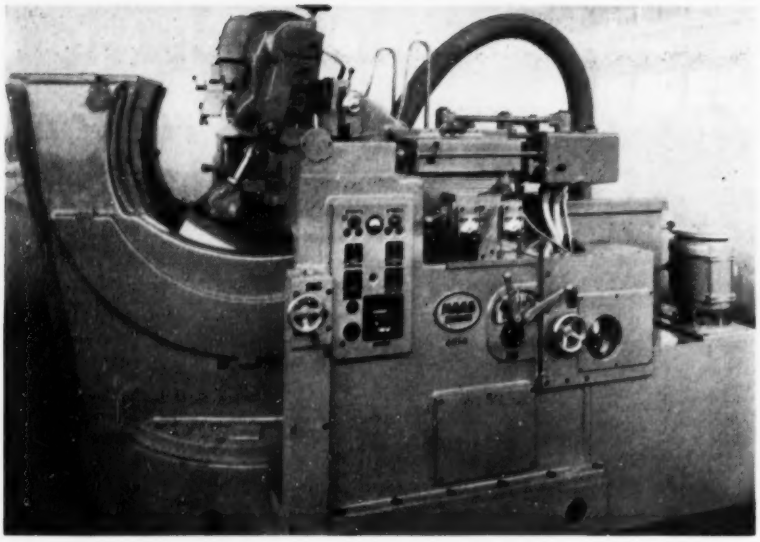
Operation depends upon a heavy, single-pivot beam which provides more accuracy than can be built into the tooling. A choice of several reduction ratios adds to accuracy and provides low micro-inch finishes. The reduction ratio principle produces piece parts to closer tolerances than those of the master.

CUSTOM-DESIGNED . . .

The basic machine is standard, but each mill is tooled for specific work. Because all machine elements are individually motor-driven, the machine can be adapted to a wide range of applications. Write for complete details and your copy of Special Bulletin 2380-C-1506.

GEORGE GORTON MACHINE CO.

1506 RACINE STREET • RACINE, WISCONSIN, U. S. A.



Maag Bevel-Gear Grinder Uses No Coolant

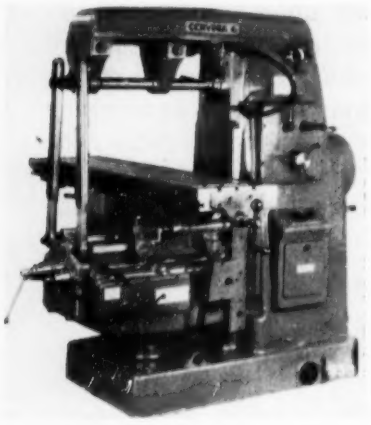
Type KS-42 bevel gear grinder grinds straight or oblique bevel gears up to 16½-in. diameter. Grinding is done without coolant, since the two saucer-shaped grinding wheels touch only one point of the gear at a time, and it is claimed that not enough heat is generated to justify use of coolant. Dust is removed by suction.

Profile is obtained by generating through a series of pitch blocks, rolling discs, and steel bands. It is said that generating mechanisms are not subject to wear for considerable time.

Wear of grinding wheels is automatically compensated for, a diamond feeler checking the wheel location approximately every 2 seconds. It is claimed that when wear is 0.00004 in., an adjuting mechanism resets the wheel to its original relation to gear surface.

Other Maag equipment includes a Bevel Gear Testing Machine, Model KP-42, and type SH-300 and SH-350 gear cutting machines for cutting spur and helical gears up to approximately 200-in. diameter.

Maag Gear-Wheel Co, Ltd, Zurich, Switzerland



Simplified Gearing Assures Power Efficiency on Italian Unit

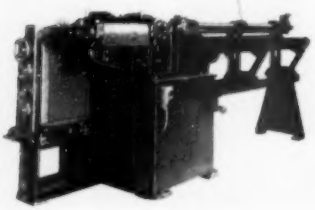
Italian-built Cervinia No. 4 milling machine has adjustable knee and column designed to distribute heavy work loads properly. Simplified gear train assures uniform delivery of power to spindle. Weighing 7070 lb, Cervinia 4 has a 67x15¾-in. table working surface with longitudinal automatic range of 47¼-in., cross automatic 13¼-in.; and vertical automatic 19-in.

Spindle, with 20 speeds and RPM 16/1000 range, has flanged end with NST hole No. 50. Machine's 24 feeds range from 3/64 to 17¾ ipm. Power rapid traverse rate is 60 ipm; spindle is rated at 8 hp and provided with No. 50 NS taper.

Wide bearing surface on top of knee assures maximum rigidity under heaviest cutting loads. Vertical cross hand-cranks are automatically disengaged and held out of re-engagement while power feed is in use.

Other features: automatic flooded lubrication, oil sight windows, noiseless gear operation, air-ventilated motor chamber mounted lengthwise to column to assure maximum rigidity of side walls, air breather to prevent condensation inside column, adjustable drive belt.

Misal Machinery, Inc, 1 East 53rd St, New York, NY



Schuster Automatic Cutter And Wire-Straightener

Model 1AV machine features variable speed drive geared to feed infinite speed changes from 50 to 200 fpm. Both basic and spring wire can be handled, basic from 3/32 to ¼ in., spring to ⅛.

The variable speed drive enables the operator to compensate for differences of temper, alloy, and size.

Mettler Machine Tool, Inc, New Haven, Conn

Cantilever Carrier Provides Handling Around Pillars

Cleveland Tramrail overhead carrier has a cantilever arrangement that permits the unit to handle loads beyond the end of the crane on which the carrier operates. Extension feature of carrier permits the hoist to reach out as much as 25½ in. beyond the end of the crane. When it is necessary to travel the crane some distance on the runway, the carrier is moved from the crane end to permit safe clearance of the columns.

Unit has a capacity of 1500 lb.

The Cleveland Crane and Engineering Co, Wickliffe, Ohio

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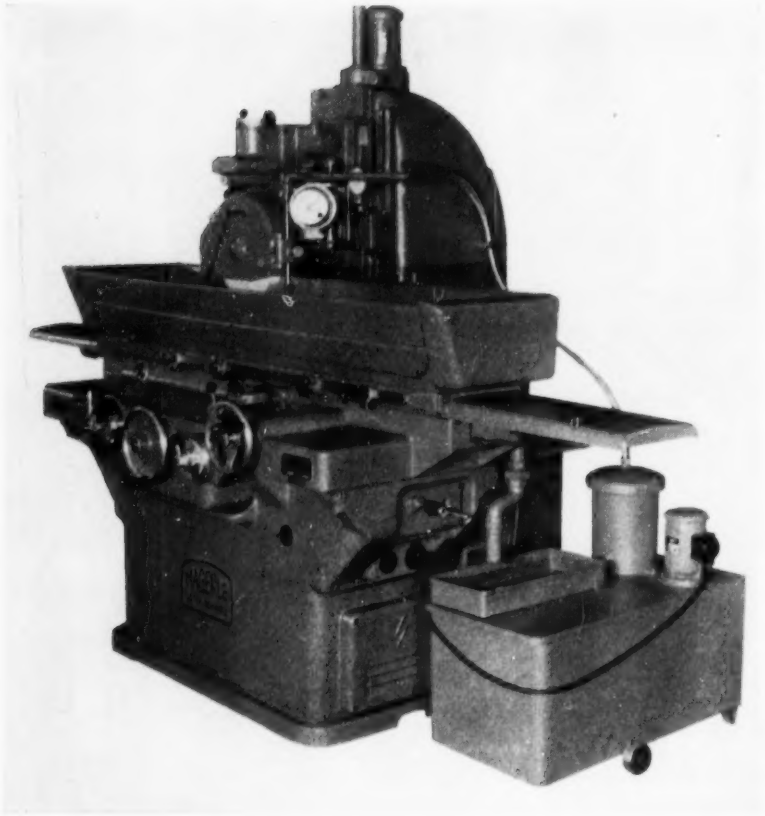


Hydraulic Surface Grinding Machine

Manufactured by Magerle Bros of Switzerland, tool and production surface grinding machines are being distributed here by Pellow Machine. These machines are said to offer exceptional accuracy and quality of finish and will complete repeated loadings of the chuck automatically to within 0.0002 in. of required size.

Head feed is controlled by an independent electrical circuit using a solenoid to operate the feeding mechanism. The amount of feed at each impulse is determined by the operator and is adjusted by a control screw which remains free for hand setting. The automatic feed operates on each longitudinal reverse of the table or, when required, on each second reversal of the table. The automatic feed is preset to stop when the required work size is obtained and a pilot light then signals completion. The machine requires no attendance during the grinding operation. A work-measuring device equipped with a 3-in. indicator reveals work size relative to the required final dimension during the grinding cycle. Feeding may also be effected by a handwheel which is graduated so each line represents 0.0001 in. head feed.

A built-in wheel dresser is standard equipment. This is coupled to the work-measuring and automatic feeding device. The table motions are hydraulically powered, longitudinally variable from 10 to 100 fpm and subject to feeds of the cross-slide of 1/32 to ½ in. Rapid travel is provided for the head in both directions and also for the cross-slide.

Machines are built with 2-, 3-, or 4-ft longitudinal table travel. Max clearance between wheel and table is 15¾ in.

Grinding wheel is 11½ in. dia and 1¼ in. wide; wheel is driven by a 5-hp motor.

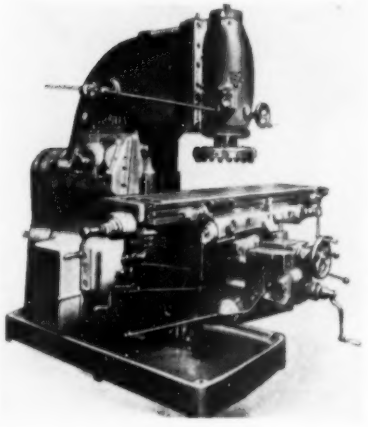
Imported by Pellow Machine Co 13500 Foley Ave, Detroit 27, Mich

Yeomans Pneumatic Ejector Pumps Low-Volume, Problem Materials

Yeomans Pneu-Pump is a low-volume, pneumatic ejector capable of handling any fluid that will flow into it, including abrasive liquids and acids, molten metals, oils, paints, and sludges.

Presence of only one moving part, a ball inlet valve, makes installation and operation simple. The unit, which will pump liquids near the boiling point, is available with cast-iron, lead- or rubber-lined, or stoneware body. Can be operated from existing compressed air supply, from a separate compressor, or, with a simple auxiliary apparatus.

Yeomans Brothers Co, 1999 North Ruby St, Melrose Park, Ill



Somua Machine Tool Line Being Distributed Here

Complete line of Somua machine tools, designed and built in France, is now being distributed in this country.

No. 5 heavy-duty milling machine is available in universal, plain, and vertical models. All have automatic-cycle table control and dual control on rear of table. Features include single lever to control both spindle rotation and automatic spindle speeds changes, hydraulic speeds change selector, mechanical feeds change selector, and independent automatic feeds (longitudinal, cross, and vertical.)

Unit has tapered anti-friction bearings; feed drive through bevel gears and shafts is protected by telescopic tubes; powered by a 25-hp motor.

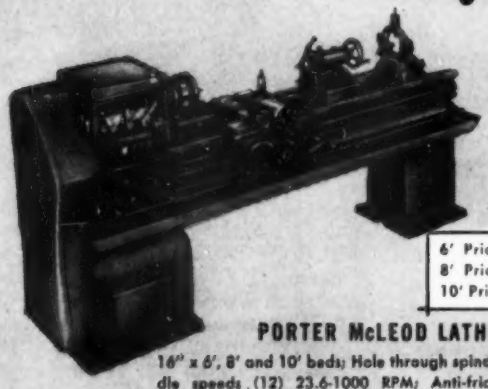
Additional units in the line include: No. 4 heavy-duty milling machine in universal, plain, and vertical; combination vertical and horizontal milling machine No. 2; and a 24-in. swing tracer controlled model P-24 geared head engine lathe, with hydraulic tracer.

Distributed by Morey Machinery Co, 410 Broome St, New York, NY

For quality and value... try to duplicate these

FINE MACHINE TOOLS AT BUDGET PRICES

Where price is equally important with the efficiency and precision you expect and need, MOREY brings you these outstanding machine tools giving top performance and versatility! Built to meet American standards and specifications they will be valued additions to your present machinery.



6' Price $4,085.00
8' Price $4,310.00
10' Price $4,590.00

PORTER McLEOD LATHE

16" x 6', 8' and 10' beds; Hole through spindle 1 13/16"; Spindle speeds (12) 23.6-1000 RPM; Anti-friction bearings; Motor 5 HP. Made in Hatfield, Mass., U.S.A.

Price $3,026.00

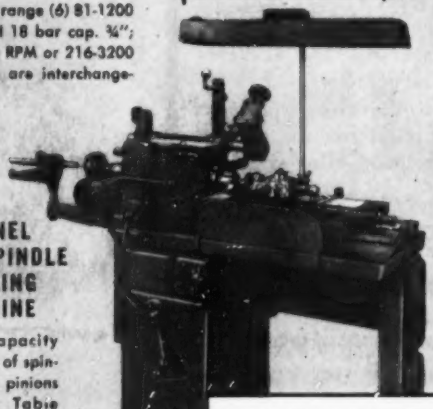
VIKING 13¾" LATHE

Distance between centers 30"; Spindle speeds (infinite) 35-1200 RPM; Motor 3 HP.

H. S. HAND SCREW MACHINE H & K RH 25 AND 18

RH 25 Price $3,274.00
RH 18 Price $3,131.00

RH 25 bar Cap. 1"; Speed range (6) 81-1200 RPM or 162-2400 RPM. RH 18 bar cap. ¾"; Speed range (6) 108-1600 RPM or 216-3200 RPM. American Mfr. tools are interchangeable.



STEINEL MULTI-SPINDLE DRILLING MACHINE

Drilling capacity .196"; No. of spindles (drive pinions only) 12; Table stroke 1 1/16"; Spindle speeds 2800 RPM; Motor ⅓ HP.

Price $462.00

WORMSER UNIVERSAL IRONWORKER
T-15 T-25

Armor Plate Construction—Triple Combination

T-15; Punch ⅞" x 7/16"; Depth of throat 14"; Shears plates 7/16"; Shears angles (square cuts) 3½" x ⅜"; Shears rounds 1 3/16". T-25; Punch 1" x 9/16"; Depth of throat 16"; Shears plates ½"; Shears angles (square cuts) 4" x ⅜"; Shears rounds 1⅜".

T-15 Price $2,907.00 T-25 Price $3,899.00

ALL PRICES FOB NEW YORK CITY SUBJECT TO CHANGE WITHOUT NOTICE

All prices include standard equipment unless otherwise noted. For complete information and specifications on any of these machines write, wire or phone . . . Better still visit our demonstration hall!

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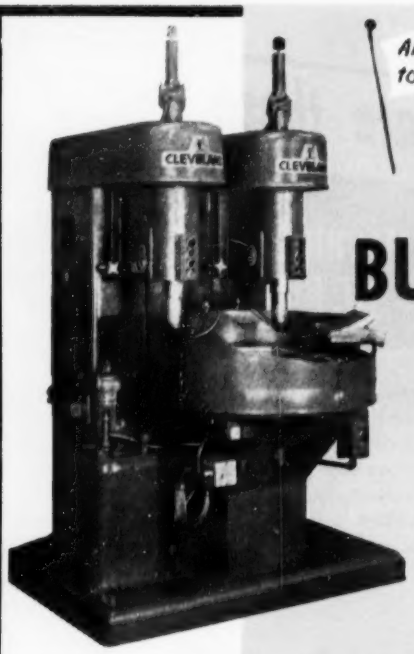


Another Cleveland Design to Speed Production!

MORE BUSHINGS— FASTER!

MODEL E4U DUPLEX FOR 1¼" to 2½"

This Tapping Guide has invaluable information for engineers and operators. Send for your copy.

To get maximum speed on larger bushings Cleveland designed this Duplex machine with a 6 station hydraulic table. It will drill and tap 1¼" to 2½" bushings with a production of 730 pieces per hour of the 2½" size at 100% efficiency. Production of smaller sizes is of course considerably higher.

Like all Cleveland Tapping Machines it utilizes the now famous precision lead screw feed that assures you of more perfect pieces at top speeds. The result is lower costs.

Keep in mind that over the years Cleveland engineers have been designing special tapping machines to meet a varied range of requirements, often combining several operations in one machine. This accumulated know-how can be put to work for you. A machine designed by Cleveland engineers to meet your special requirements will definitely result in lower production costs.

Write today for Catalog No. AR-69

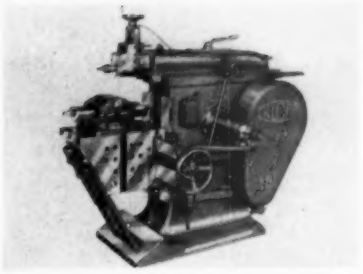
THE CLEVELAND TAPPING MACHINE CO.

A Subsidiary of
AUTOMATIC STEEL PRODUCTS, INC.

CANTON 6, OHIO

For Better Tapping--Faster!

CLEVELAND *lead screw* **tapping machines**



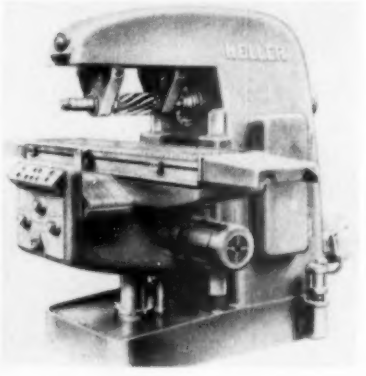
German Shaper Features Controlled-Contact Drive

Mechanical shapers distributed by Kurt Orban use a controlled-contact drive in which the pressure between friction wheel and drive wheel is always proportionate to the load on the machine. A single lever controls on and off positions of the motor, engaging and disengaging of drive, and setting and releasing of brake. The motor is mounted on a see-saw base plate. In running position a spring presses a synthetic rubber wheel, mounted directly on the motor shaft, against the cast iron drive wheel.

This drive enables the motor to start under no-load conditions, prolonging motor life and resulting in power savings. In addition, the shock of contact of tool and work is cushioned.

Shapers are available with stroke lengths of 16 3/4, 20 2/3 and 26 5/8 in.

Imported by Kurt Orban Co, 205 E 42 St, NY 17, NY



Heller Milling Machines For Heavy Duty, High Production

Model FH 140 and FV 140 milling machines combine high power and automatic cycling for production runs.

Power supply is 1800-rpm motor, 20 to 30 hp for horizontal miller, 20 to 40 hp in vertical machine. Hy-

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It's produced by J&L, the *originator* of these grades.

It's available in grades suited to a wide range of applications.

It's supplied as cold-drawn or cold-drawn with metallurgical processing which includes special tempering.

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It's backed by J&L steel-making know-how that can help you apply it to your particular applications.

Set the wheels in motion towards determining how you can produce better parts, faster, with Jalcase, the original open hearth free-machining steel. Fill in the coupon to get detailed descriptive information on J&L Jalcase . . . or, better still, contact the J&L representative nearest you today.

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For your everyday grinding jobs see your Simonds distributor. He can supply you with the right wheels. He carries large stocks for all grinding operations on metals and non-metals. They're conveniently listed, with standard specifications, in free data book. For special jobs calling for individually made wheels, Simonds Engineering service is at your call. Let our engineers help you determine the wheels you need for the greatest possible efficiency on these jobs. Consultation is free.

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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y. Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

draulic pumps are 4 hp, and both machines have ¼-hp coolant motors.

Spindle speeds vary from 40 to 1075 rpm, which, with a maximum diameter cutter of 16 in., gives potential cutter surface speed of roughly 5300 fpm.

Feed is hydromechanical, steplessly variable from ¾ to 40 ipm longitudinal and cross, and 3/16 to 10 ipm vertical, with rapid traverse of 80 ipm longitudinal, 40 ipm cross, 20 ipm vertical.

Machines are available with several combinations of automatic control, including preselector cycling, in which stops are set and operational sequence is then manual; full automatic cycling, in which the first piece is done manually, and remainder of pieces are duplicated by pushbutton cycling; and electro-hydraulic feeler control, for contour milling from a templet or sample part.

Lubrication is centralized Vogel one-shot system, which pumps oil through tubes to each oiling point.

Heller Machine Co., 11½ Liberty St, NY 6, NY

Retractable Third Wheel Eases Hand Truck Operation

Magnesium hand truck with retractable third wheel has been introduced by Magline.

When wheel is extended, truck can be operated in a three-point position, preventing any load from bearing on the operator; when truck is stopped in this position, it can be re-started without the physical effort normally needed to overcome dead load-weight. When desired, the extra wheel retracts against the frame.

Nose unit extends beyond the wheels on either side, preventing flexible loads from binding against the wheels. All parts are mechanically joined, replaceable when worn. No weld maintenance required.

Magline Inc, Pinconning, Mich

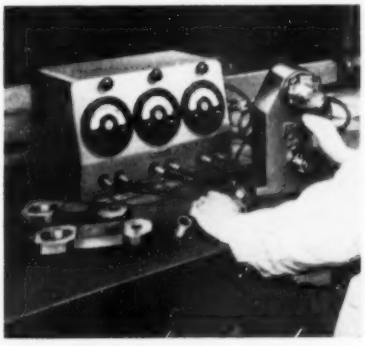
Industrial Fluoroscope For Light Alloys and Plastics

Scopemaster fluoroscope, product of General Electric, is designed for mass inspection of light alloy castings made by sand, permanent mold, die, or other techniques; also for the inspection of plastic products. It is said to be useful for mass inspection of concealed assemblies, hydraulic, mechanical, or electrical components, and for efficient guidance of new product development in the laboratory.

A single external control handle permits moving of parts to be inspected in any lengthwise or crosswise direction while in the x-ray beam. The distances between the receiving screen and the part may be adjusted by the operator during the inspection.

The unit operates from a 110-v, 60-c source. It has a 9x19-in. front opening through which products are inserted for viewing.

X-Ray Dept, General Electric, 4855 Electric Ave, Milwaukee 14, Wis



Computing CompAIRator Removes Variable From Readings

Variations in diameter reading are applied to both sides of the reading in this computing indicator. Thus, when checking such values as taper, concentricity, and clearance, only one reading is taken, and on one dial. This device is said to lead to greater

Right at your own desk...

See the big difference in floor absorbents

Here's one who saw the difference:

Mr. A. Cipperman, Purchasing Agent

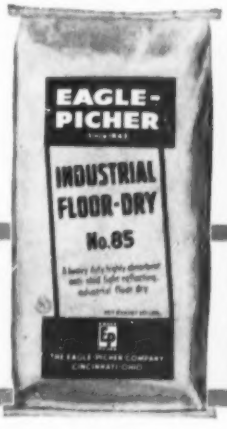
"I never realized the difference between oil absorbents until it was graphically demonstrated to me with the Eagle-Picher comparison test."

Smart buyers naturally want *proof* before purchase. And proof is what you get when you witness Eagle-Picher's comparative test of floor absorbents. With his portable laboratory, your Eagle-Picher representative will analyze your present floor absorbent right at your desk, or you can conduct the test yourself. Either way, there's no obligation, of course.

Here's what the test shows—

- The amount of oil and water absorbed for given bulk.
- The cost of your absorbent in terms of absorption and coverage.
- The amount of coverage you're getting.
- The benefits of your absorbent in terms of safety and reflective ability.

You'll see that Eagle-Picher Floor-Dry is insoluble, chemically inert and non-combustible . . . that it combines light weight for exceptional coverage with light color for brighter, safer working areas. Write today for the full story.



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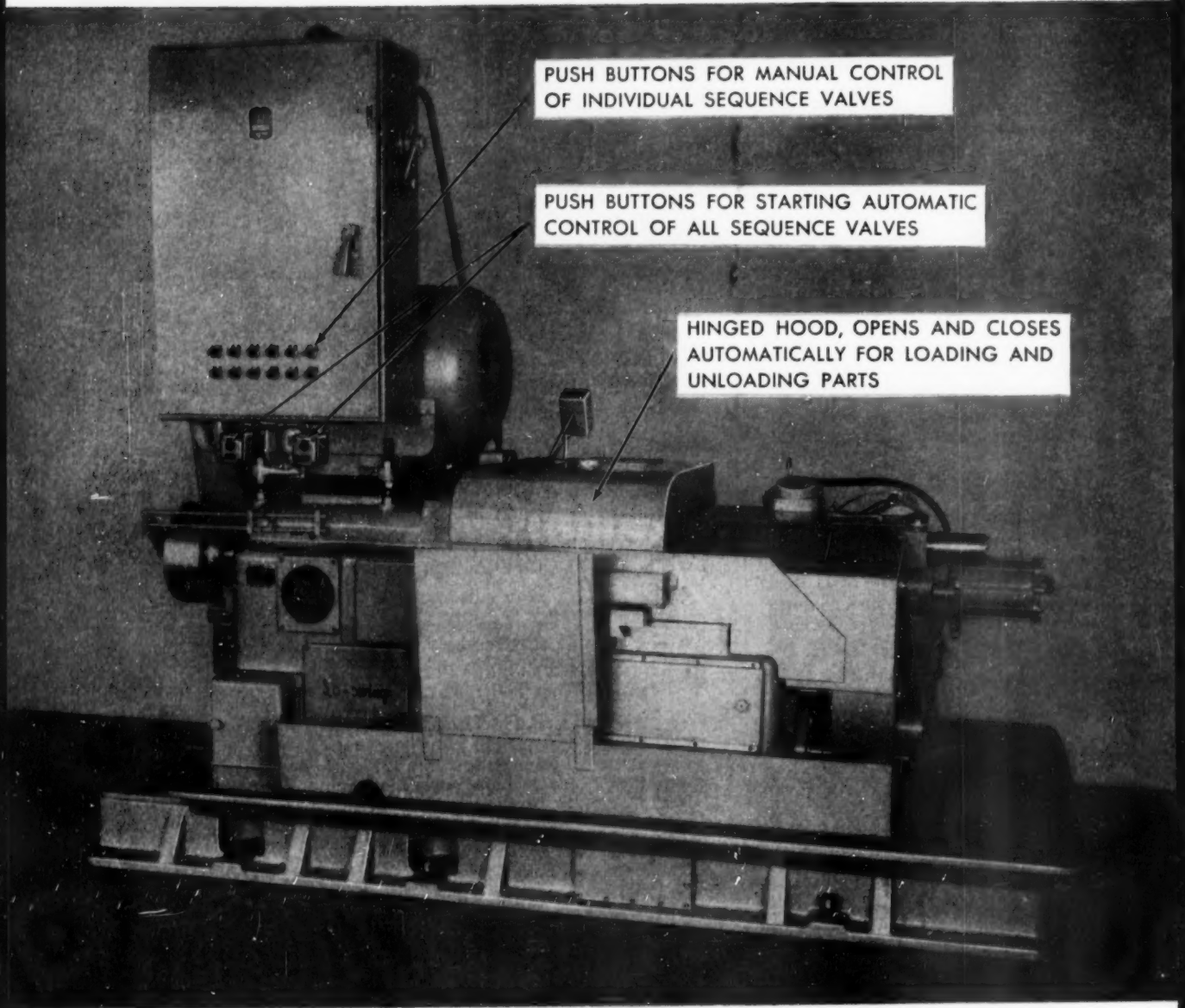
MACHINE OF

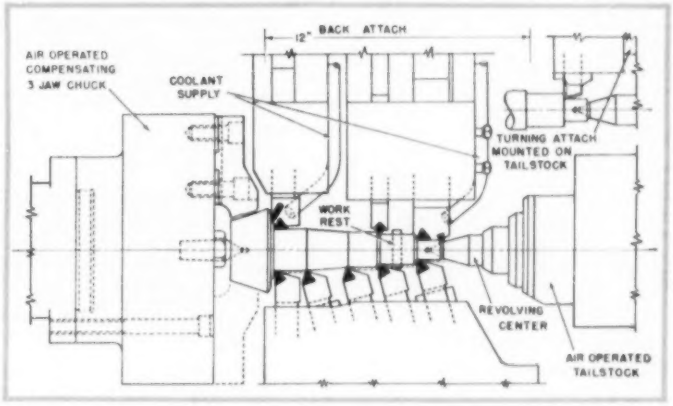
Lo-swing LATHE EQUIPPED WITH AUTOMATIC CONTROLS REDUCES HANDLING TIME


PUSH BUTTONS FOR MANUAL CONTROL OF INDIVIDUAL SEQUENCE VALVES
PUSH BUTTONS FOR STARTING AUTOMATIC CONTROL OF ALL SEQUENCE VALVES
HINGED HOOD, OPENS AND CLOSES AUTOMATICALLY FOR LOADING AND UNLOADING PARTS

PRODUCTION COSTS

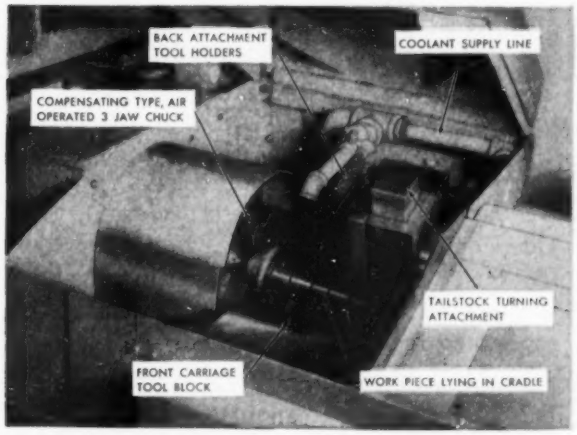
THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Problem: **To reduce handling time and operator fatigue in machining operations on Axle Pinions.**

Solution: **A Model AR Automatic Lo-swing Lathe, tooled as illustrated, was selected for this job. Work is held on centers and driven with an air-operated, three-jaw compensating chuck. Five carbide front turning tools, two of which are template operated, reduce the length of cut to 1-7/8", which is the length of the taper portion. An additional tool, mounted in a tailstock turning attachment, partially removes surplus material on the threaded diameter in advance of the front turning tool which finish turns this diameter. Six carbide tools on the rear slide face and chamfer the shoulders.**


BACK ATTACHMENT TOOL HOLDERS
COOLANT SUPPLY LINE
COMPENSATING TYPE, AIR OPERATED 3 JAW CHUCK
TAILSTOCK TURNING ATTACHMENT
FRONT CARRIAGE TOOL BLOCK
WORK PIECE LYING IN CRADLE

▲ *Hinged hood in open position for loading and unloading parts.*

◀ *Tooling area of machine is entirely enclosed, protecting operator from flying chips and coolant.*

The machine stops automatically at the end of the cycle with spindle stopped, chuck jaws released, tailstock center retracted, hinged hood open and with the machined part dropped into a cradle. The operator simply replaces the finished part with a rough forging and then pushes the two starting buttons, energizing the loader controls, which consecutively close the hood, places the work between centers, closes the chuck jaws and finally starts the headstock spindle rotation. The automatic cycle from then on is controlled by automatic camming built into the base machine.

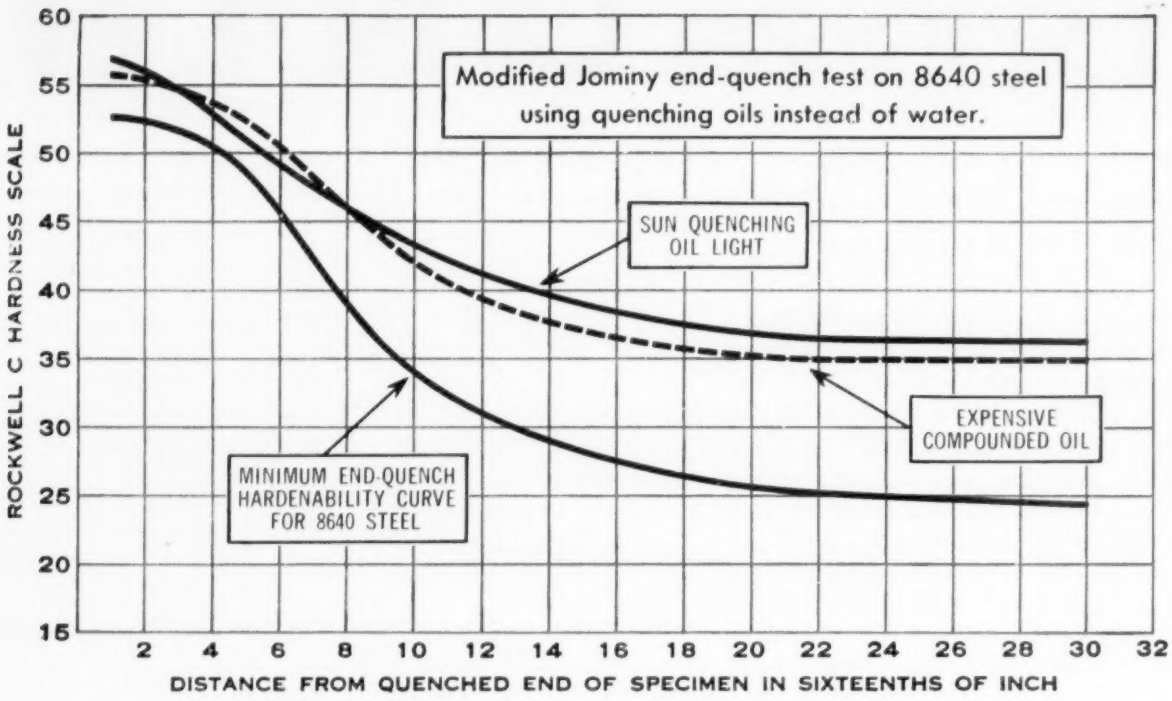
The tooling area of the machine is entirely enclosed to protect the operator from flying chips and coolant, while cutting at high spindle speeds. Two starting buttons, wired in series, oblige the operator to use both hands, and are so located that the operator is out of range of the closing hood, thereby preventing accidents.

Control buttons on the door of the starter panel permit normal operation of individual controls and are convenient for setting up and timing loader movements.

Seneca Falls engineering staff is at your disposal to help solve your engineering problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

ARE LOWER WITH *Lo-swing*



You can do 95% of all quenching jobs by using SUN QUENCHING OILS

This has been proved again and again in industrial heat treating departments and in the laboratory. The above test curves compare the results obtained from Sun Quenching Oil Light and those from an expensive compounded quenching oil. The hardnesses obtained are far above the commonly accepted minimum.

In addition to assuring consistently uniform physical characteristics, Sun Quenching Oils prevent sludge formation and help remove any deposits that may exist. Oil coolers are kept clean; maintenance costs are decreased. Sun Quenching Oils lower operating costs too. They thin out when heated, drain off parts faster and more completely. Make-up is materially reduced.

For more information about Sun Quenching Oils and how they can help you, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AM-6.

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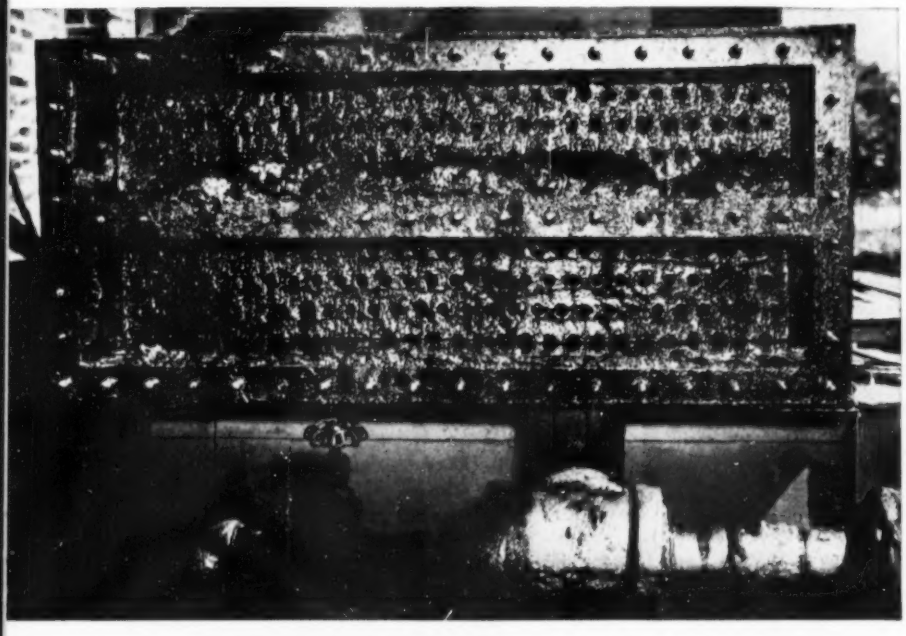
SUN OIL COMPANY

SUNOCO

PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

THIS PLANT QUENCHES ALL TYPES and sizes of automotive and aircraft forgings. Sun Quenching Oil Light serves all five of the 2400-3000 gallon systems. In the seven years the shop has been using this oil, no unit has been down except for normal mill scale removal.



AN OIL THAT FORMS SLUDGE CLOGS oil coolers, increases maintenance and operating costs. Sun Quenching Oils have a natural detergency which helps keep the systems clean and removes any deposits that may exist.

INDUSTRIAL PRODUCTS DEPARTMENT

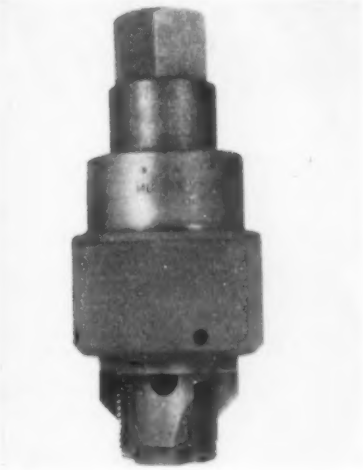
SUN OIL COMPANY

SUNOCO

PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

accuracy by removing operator errors resulting from taking the difference between two readings.

The Taft-Peirce Mfg Co, Woonsocket, RI



Landis Special Solid Adjustable Tap

Landis special solid adjustable taps tap and chamfer standard pipe and drainage fittings in one operation. Taps are available for pipe ranging from 1¼ to 4 in. and are designed for application to Pottsdown, Cleveland, and other reversing spindle machines.

Chamfering blades are incorporated in the tap body and removable chasers and blades can be replaced after repeated regrinding.

The tapping operation is performed on the forward portion of the machine cycle while chamfering is completed on the reversing segment. This feature divides the torque load and supplies a chamfer without leave-off marks.

Taps will be furnished with square or hexagon end drivers or cylindrical shanks. Models are available for right- and left-hand, straight, and tapered tapping. Alloy steels are used and all parts subject to wear are nitrided.

Landis Machine Co, Waynesboro, Pa

Syntron Sander-Polisher

Electric sander-polisher, with available attachments and accessories, can be used for sanding, polishing, buffing, drilling, and light bench grinding and wire brushwork.

Unit is furnished complete with lambswool bonnet and sanding disks. Motor is 115 or 230 v, ac or dc.

Syntron Co, 311 Lexington Ave, Homer City, Pa

New XL BOND
FOR CARBIDE TOOL AND CUTTER

Grinding

EFFICIENT ECONOMICAL
ROUGH GRINDING AND FINISH GRINDING
NEAREST THING WE KNOW TO A DIAMOND WHEEL
FOR PRECISION AND OFFHAND GRINDING

Another Chicago Wheel FIRST

"XL" is Chicago Wheel's exclusive new bond for silicon carbide vitrified grinding wheels, especially made for grinding carbide cutting tools. Supplied in most popular sizes and steel backs. Prompt delivery. Keep your production up . . . costs down, with "XL."

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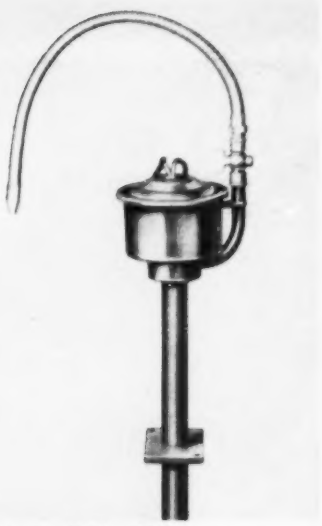
CHICAGO WHEEL & Mfg. Co.
Dept. AM, 1101 W. Monroe St., Chicago 7



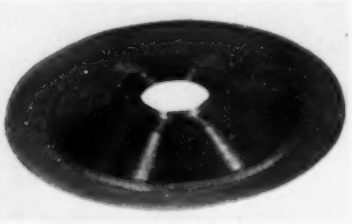
Viking 1/30-hp Motor-Driven Coolant Pump

Motor-driven coolant pump is powered by a 1/30-hp oil-sealed motor and is designed to operate efficiently with all types of water-soluble coolants and oils up to 20 SAE viscosity. Unit has a rated capacity of 100 gph at a 1-ft head.

Motor is a shaded-pole type, operating on 110-v, 60-c ac at 1500 rpm. The centrifugal pump is mounted directly on the extended drive shaft. Inlet pipe has a ½-in. opening and is equipped with an automatic foot-valve to hold prime. Flexible spout outlet is ¼ in.

Unit weighs 3 lb, measures 4½ in. in dia and 15 in. in height. Housing is of heavy-duty brass; spout is flexible spring steel tubing connected to a copper shut-off cock. Price: $36.00.

Viking Industries, Rockford, Ill



Electroplated Nickel Bond Diamond Wheels

Electroplated nickel bond diamond wheel line developed by Ohio Metal Working is said to result in major economies in cost-per-tip carbide tool grinding. The bonding process electrolytically deposits a dense nickel bond around each diamond particle. Reportedly, extended wheel life is obtained at greatly reduced cost.

This process requires the use of

THREADED SPECIALTIES

EYE BOLTS
by an exclusive method

Among Pawtucket's many specialty products, these lower-cost eye bolts or "swing" bolts are the leaders in this field. Pawtucket's exclusive production method keeps cost low, dimensional accuracy unusually high and strength above standard.

Pawtucket eye bolts are made in standard sizes ¼" and larger, or to your specifications. In any size, you can depend on a uniform Class 3 fit.

BETTER BOLTS SINCE 1882

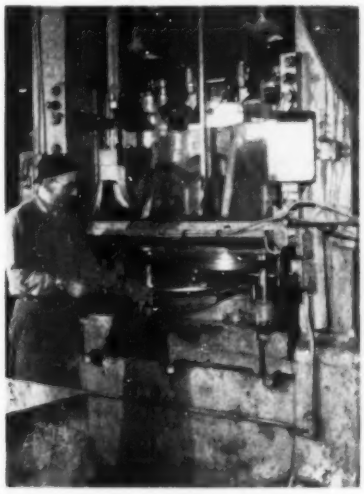
PAWTUCKET
"THE BOLT MAN"
MANUFACTURING COMPANY
327 Pine Street Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS

only one layer of diamonds which is applied to each wheel in the greatest concentration the nickel can hold.

Because fewer dressings are required, the diamonds are used up instead of being dressed out of the wheel; it is even being used for roughing as well as finishing.

Wheel is 6x$\frac{3}{4}$-1$\frac{1}{2}$ in.; cost approximately $83.

Ohio Metal Working Products Co, Cleveland, Ohio



Radioactive Wristbands Lock Punch Press

Safety device uses radioactive bands on wrist of punch press operator to lock press by activation of Geiger tube whenever hands are in danger zone. Device has the advantage over electric eye by giving area rather than beam protection; in addition dust or oil film cannot diminish radiation strength.

A timer makes the press inoperative about 15 sec after stock is removed; an operator who has removed his bands cannot resume work because the wristbands must be passed within range of the detector to reset the timer.

The material, radium, can be placed in a ring for use in applications where the operator must hold small work close to a die. Halogen-quenched Geiger tubes are all-metal construction and have a life unlimited by use. Tubes are shock-mounted in the detecting head and have a $\frac{1}{8}$-in. sheet of lead shielding on the side away from the danger area to give a sharp transition zone.

In the illustration the tubes are mounted horizontally in the housing above the die and the control cabinet is at the right on the press.

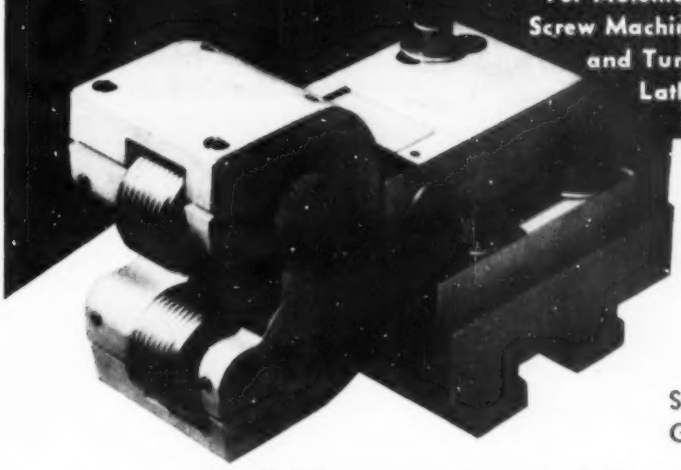
Cost is about $160.

Modern Air Corp, 400 Preda, San Leandro, Calif

REED RID C

Thread Rolling Attachments

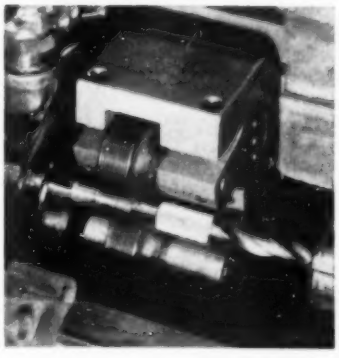
For Automatic Screw Machines and Turret Lathes



Series G2A

✶ **Full Diameter Range to Capacity**

✶ **Simple Precision Matching . . .**



Reed attachments have two opposed rolls which pass over the work when rolling the thread. They are easy to set up and rolls may be quickly changed and adjusted for size. A simple device provides for precise matching of the rolls.

Thread rolling is accepted as an economical and preferred method of producing smooth precision threads on automatic screw machines and turret lathes at high production rates. It permits threading close to shoulders and since rolling can be done on the collet end of the part behind shoulders, a secondary threading operation is often eliminated.

The series G2A Reed Thread Rolling Attachments are multi-purpose tools currently built in four popular standard sizes. Each attachment will accommodate an unlimited range of diameters within its capacity—only a single attachment is required for rolling all diameters within the size range. Straight or taper threads may be accurately rolled whether they are right or left hand or have multiple leads.

Send us specifications of your requirements and let us supply you with complete information.

REED ROLLED THREAD DIE CO.

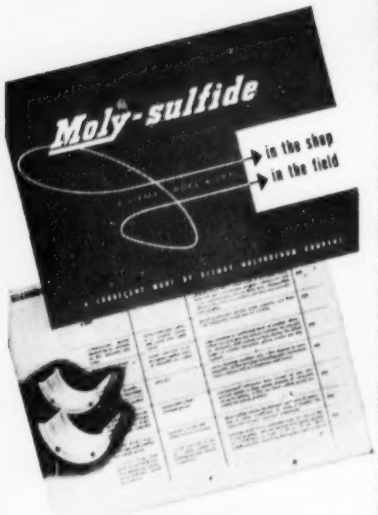
THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS

Worcester, Massachusetts, U.S.A.

Sales Offices in: Buffalo, Chicago, Cleveland, Compton, Calif., Detroit, Englewood, N. J., Houston Indianapolis, Milwaukee, Montreal, New York City, Philadelphia, Pittsburgh, St. Louis, Syracuse, Toronto

028

154 ideas on ways to use...



154 varied applications of molybdenum sulfide in the shop and in the field are described in a new booklet now available. This solid-film lubricant has demonstrated unique anti-friction properties under conditions of extreme pressure, high velocity, elevated temperature, or chemical attack.

The 40-page booklet contains the records of solved lubrication problems — some might solve your own.

Moly-sulfide
A LITTLE DOES A LOT

The lubricant for extreme conditions

Climax Molybdenum Company
500 Fifth Avenue
New York City 36 N Y

Please send me your Free Booklet on *Moly-sulfide*
Name.....
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Company.....
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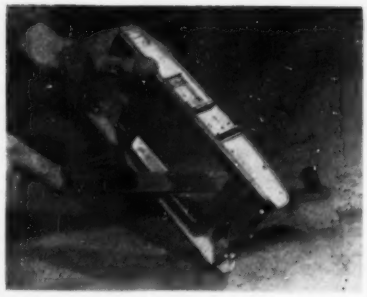
MOLY

A.M.—6 MS-6A

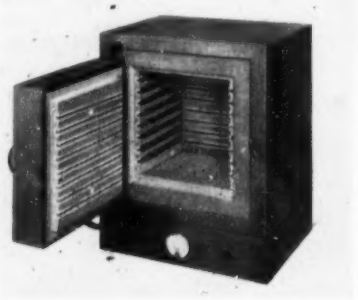


File Surface Feeds From Abrasive Roll

Abrasive file is used like conventional metal file but cutting surface feeds from coated abrasive roll. Device is designed for deburring and other filing and finishing operations in metalworking.

Featuring an 11-in. stroke, the file holds roll of 6 ft of abrasive cloth. One-inch-width file costs $2.95, 1½-in., $3.78. Rolls are available in 50-yd lengths with grits ranging from 24 to 320.

Minnesota Mining and Manufacturing Co, 900 Fauquier St, St Paul 6, Minn



Dyna-Kiln Electric Furnaces Heated by New Principle

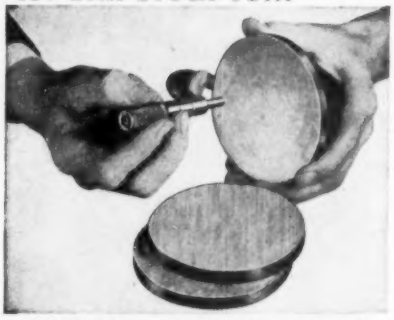
Line of 37 Dyna-Kiln electric furnaces is available in 2050 and 2300 F heat ranges.

Available in front-loading and top-loading models, new element holders hold Dyna-Glow elements in place, assuring more even temperatures than previously possible. Coils, which do not protrude into the interior of the furnace, may be replaced in minutes with a pliers and screwdriver. Automatic controls are available for all models.

Each model is equipped with one or more pilot lights and two pyrometer holes for thermocouples to assure accurate temperature control. Switches are 3-heat type, UL approved. Furnaces, elements, and switches are guaranteed for a year.

L & L Manufacturing Co, 804 Mulberry St, Upland, Chester, Pa

Atlantic
RAKER SET BANDS
CUT BAR STOCK TO...



CLOSER TOLERANCES FOR NELCO TOOLS—

Sections of bar stock are cut to exacting tolerances for bodies of NELCO carbide face mills, side mills and allied products. Atlantic raker set band saws do the job better—no travel, no scored faces. A section of cut bar stock selected at random from production cutting measured to a tolerance of .002 from top of cut to bottom—an outstanding example of precision Atlantic band saw operation.

For all operations requiring a tough —true running band saw — when cuts **must be absolutely perpendicular to the axis of the stock** — for uniformity . . . for precision . . . look to Atlantic Saws. Try them on your equipment for amazing results!

FREE!

THIS PICTORIAL STORY on Atlantic RAKER SET BANDS. Send for your copy today. Have you a specific application you are wondering about? Include a brief description — it will meet with interested, engineering attention and be promptly acknowledged.

Atlantic
ATLANTIC SAW MFG. COMPANY, Inc.
BREWERY STREET New Haven, Connecticut

No. 119 of a Series of Typical Installations

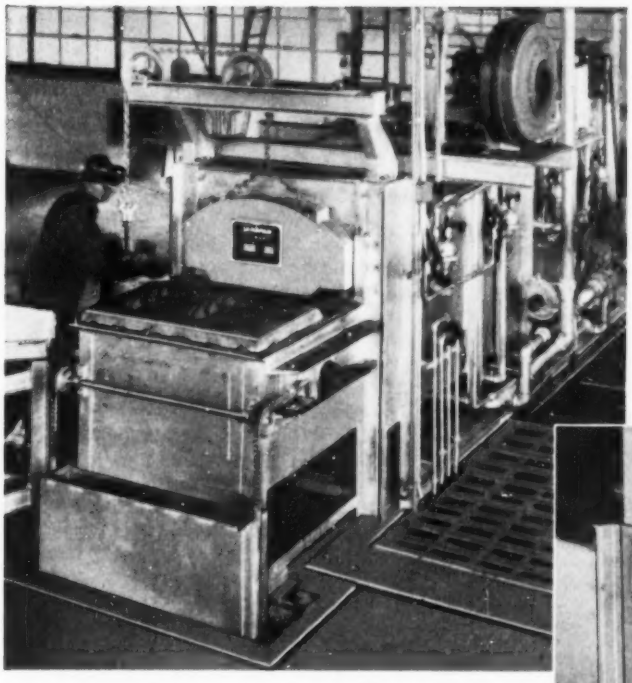
Sunbeam STEWART

THE BEST INDUSTRIAL FURNACES MADE

HOW SUNBEAM INDUSTRIAL FURNACES MEET THE DEMANDS ON THE PRODUCTION FRONT

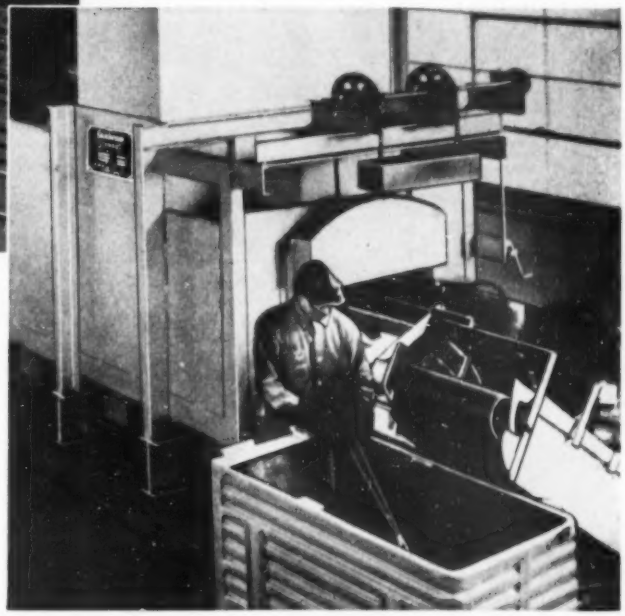
CONTINUOUS PRODUCTION OF FORGINGS

At INTERSTATE DROP FORGE, Milwaukee, Wis.



Flexibility is very important at Interstate Drop Forge. Relatively short runs on different types of forgings are processed. Custom drop forgings for some 300 customers in 50 industries are made from carbon, alloy, stainless and tool steels with heat treatment specified to meet the required physicals for each application. With the variety of work handled by Interstate, practically every kind of heat treatment problem in the steel forging field must be met.

This Sunbeam Stewart heat treat line is U-shaped to facilitate its installation within the available floor space. The quench tank projects beneath the discharge end of the hardening furnace at 90° to the furnace. A dual quench tank conveyor removes work from either the oil or water quenching media and transfers the work to the draw furnace.



The hardening furnace has a usable heating space of 30 inches wide by 10 feet long. A continuous smooth cast-link conveyor belt minimizes distortion. An alloy discharge chute entirely enclosed within the furnace protects work during quenching cycle. To increase flexibility, this heat treat line has a double quench tank for both oil and water mounted on a special car.

Usable heating space of the recirculating draw furnace is 36 inches wide by 16 feet long. The conveyor belt returns inside the furnace heating chamber to increase the efficiency of the unit by maintaining belt temperatures near operating temperature. Two separate combustion chambers are employed with combustion being completed within each chamber.

IF YOU ARE CONSIDERING DEFENSE WORK CALL SUNBEAM. Designs are available for heat treating the following materiel:

SHELLS: 57MM; 75MM; 90MM; 105MM; 120MM; 155MM; 3", 5", 6", 8" Navy Shells (Harden, Quench and Draw).

FORGINGS: Rotary Hearth and Pusher-type Forging Furnaces.

ARMOR PIERCING SHOT (Harden, Quench and Draw).

CARTRIDGE CASES (Anneal, Stress Relieve).

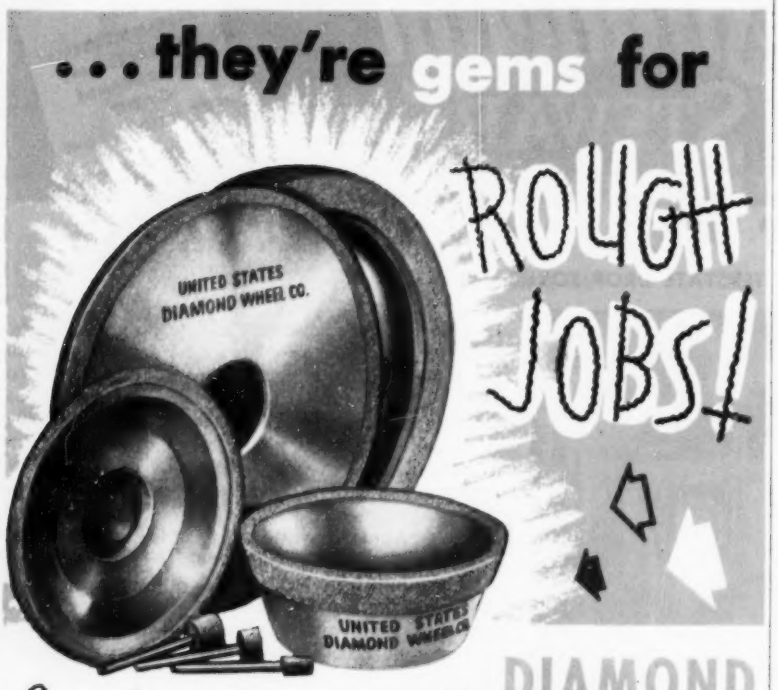
MACHINE GUN CLIPS (Harden, Quench and Draw).

JET AIRCRAFT and TANK PARTS

Sunbeam CORPORATION (Industrial Furnace Division)

Main Office: Dept. 119, 4433 W. Ogden Ave., Chicago 23—*New York Office:* 322 W. 48th St., New York 19—*Detroit Office:* 3049 E. Grand Blvd., Detroit 2
***Canada Factory:* 321 Weston Rd., So., Toronto 9**

A letter, wire or 'phone call will promptly bring you information and details on SUNBEAM industrial furnaces, either units for which plans are now ready or units especially designed to meet your needs. Or, if you prefer, a SUNBEAM engineer will be glad to call and discuss your heat treating problems with you.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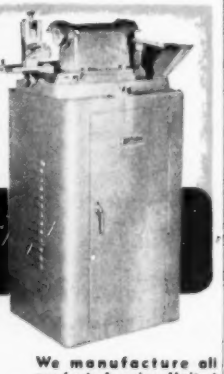
ROUGH JOBS!
UNITED STATES DIAMOND WHEEL CO.
UNITED STATES DIAMOND WHEEL CO.
Specialists in Resinoid and Metal Bonded
DIAMOND WHEELS

U. S. Diamond Wheels are famous throughout industry because they are the finest wheels for production tool maintenance . . . highest quality at competitive prices . . . every wheel production-guaranteed.

USE THEM TO LOWER YOUR OVERHEAD

Extra-long high performance. Rapid stock removal. Perfect "spark-out" on large diameter cutters. Faster cutting action. Maximum economy of carbide removed per dollar of wheel cost.

Our Model CH-105A CARBIDE TOOL GRINDER has proved its dependability and economy in years of hard service. Floor model with eye-appealing cabinet enclosing coolant system. High shaft speed for efficient small diameter wheel use. Two diamond wheels for offhand and chipbreaker grinding.



UNITED STATES DIAMOND WHEEL CO.
835 Illinois Avenue, Aurora, Illinois

• Send me your new illustrated catalog price list of diamond wheels and grinders.

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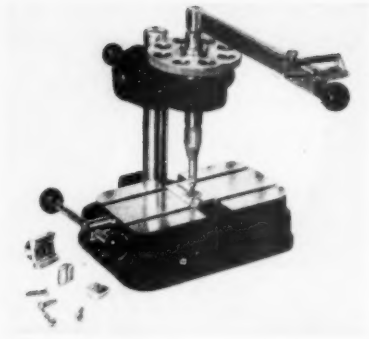
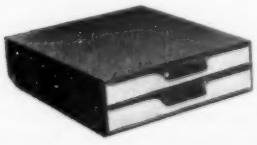
We manufacture all products bearing United States Diamond Wheel name or trademark.



Sturtevant Torque Testing Fixture

Torque testing fixture is available in two models with capacities of 0 to 200 in-lb and 0 to 150 ft lb. A fully adjustable spindle set in instrument bearings is held in rigid alignment and permits rapid engagement of the driver with the work. The spindle has a female drive square to accommodate a wide selection of torque wrenches within the capacity of each of the two models. The driving end of the spindle is threaded so that users may design drivers for special applications. A standard male drive square attachment is included with each fixture and is fitted to the driving end of the spindle. This permits using regular sockets or socket screwdrivers without alterations. A T-slot base makes it convenient for a user to clamp nests and holder to the fixture.

P A Sturtevant Co, Addison, Ill

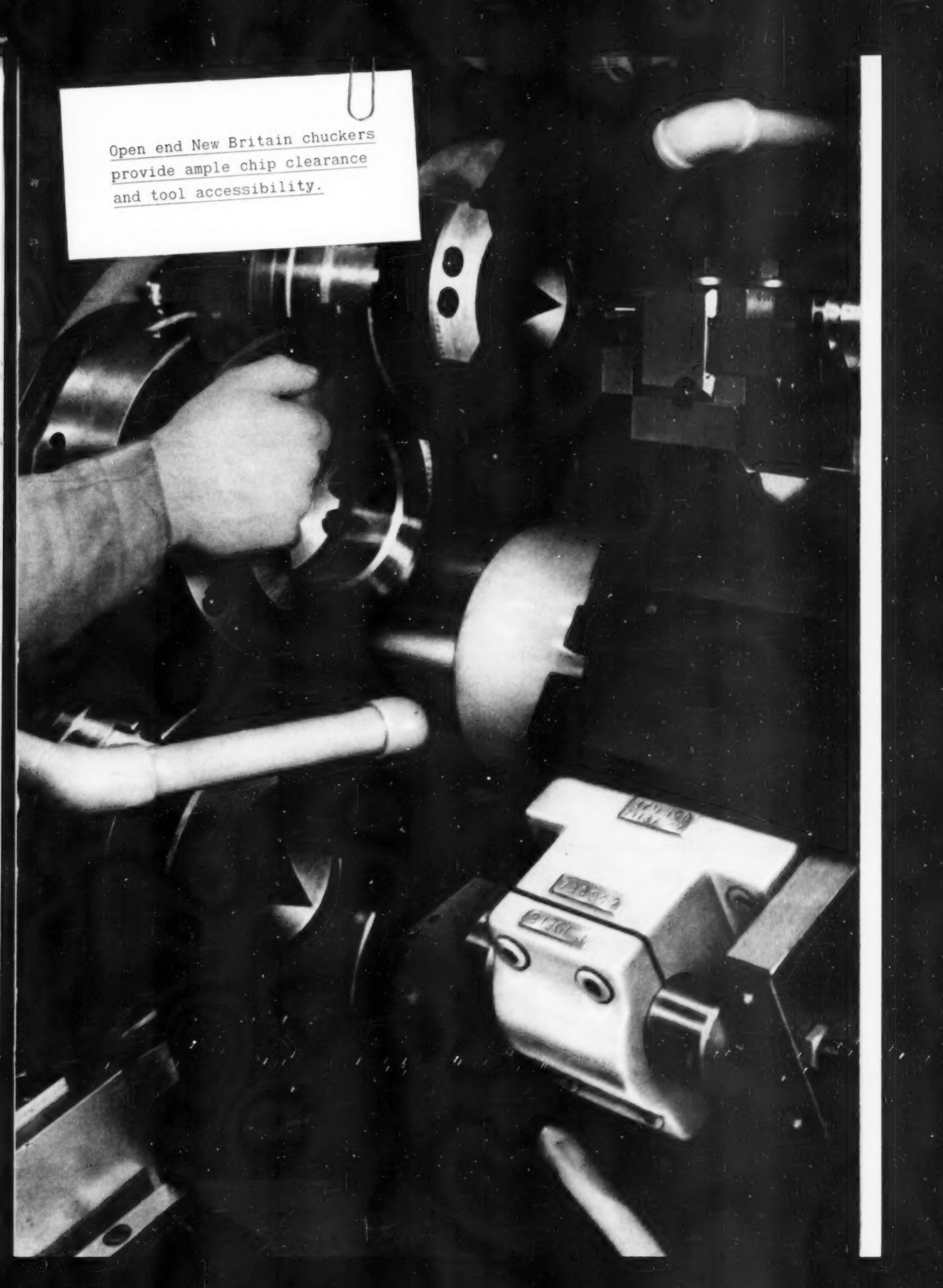


Tiny Parts Cabinet

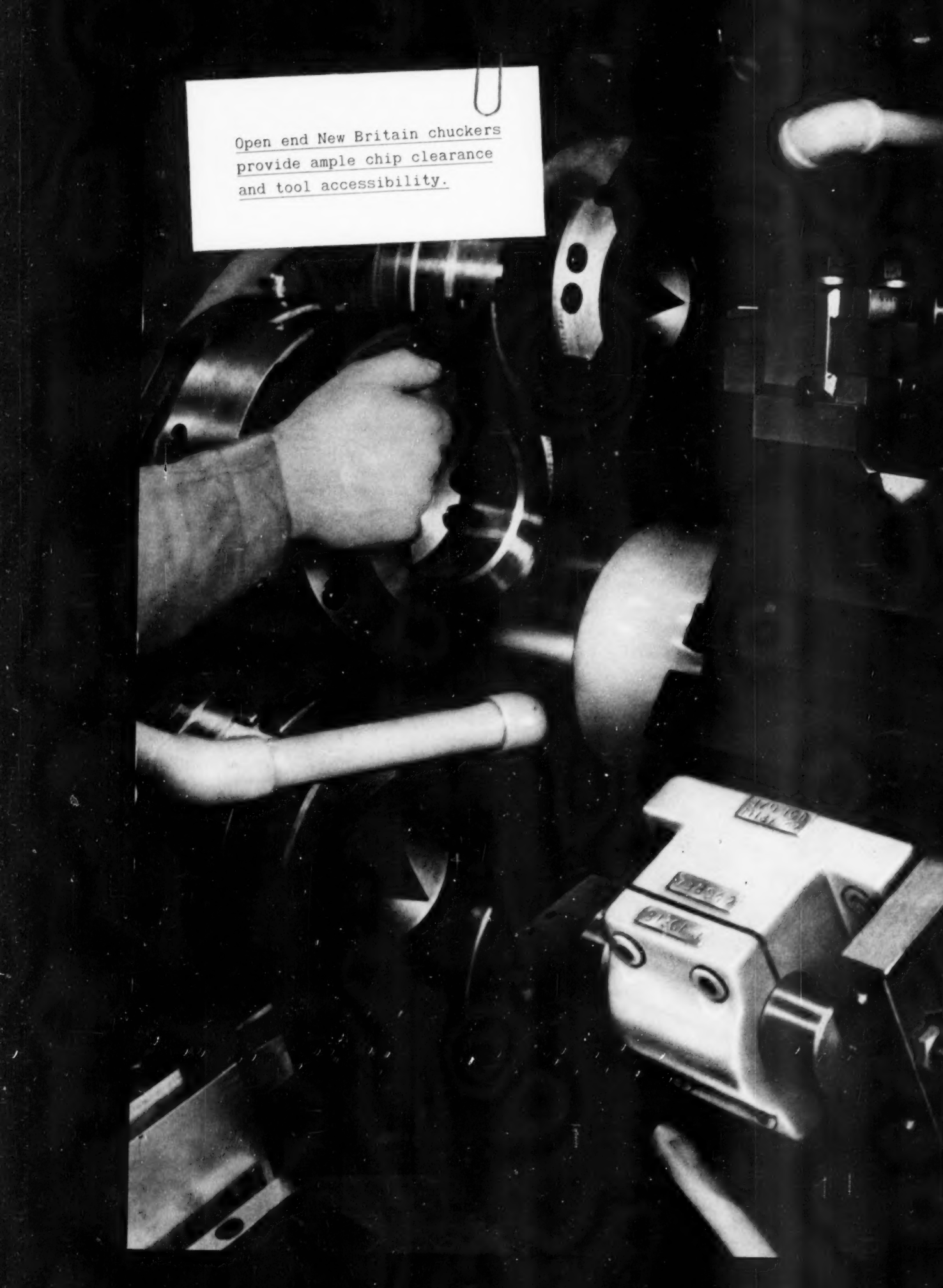
Little Gem tiny parts cabinets consist of two 1½-in. drawers in one-piece frame having overall size of 3¼x11x11 in. Construction is of steel. Each drawer is furnished with eight dividers, giving the cabinet a total of 24 adjustable compartments. Extra dividers make possible a total of 56 compartments per unit. Tabs turn up and engage shelf above when stacking units. Weight: 10 lb; cost: $8.90.

Units may also be inserted in manufacturer's standard parts cabinet in place of two drawers.

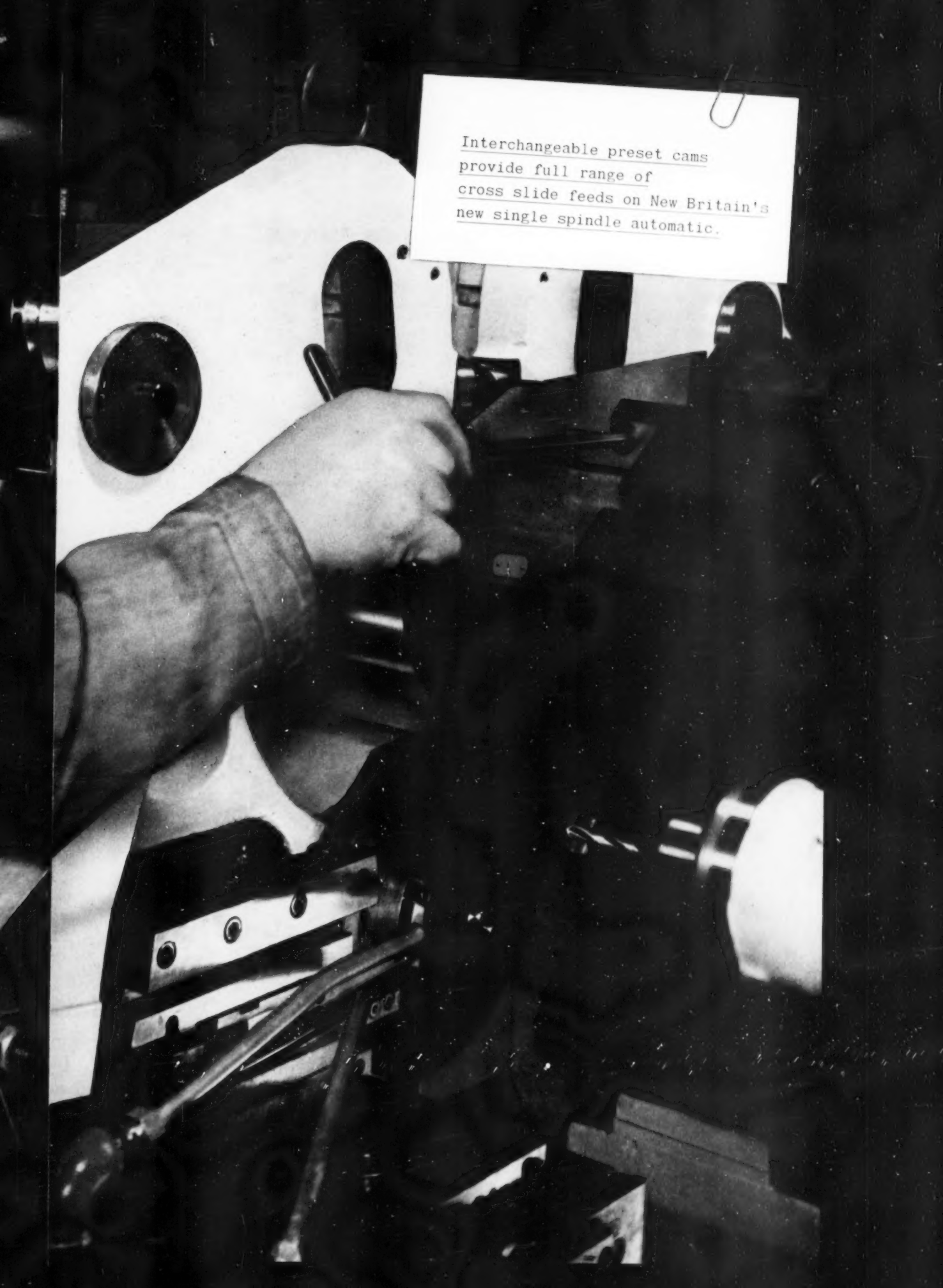
Precision Equipment Co, 3714 Milwaukee Ave, Chicago 41, Ill



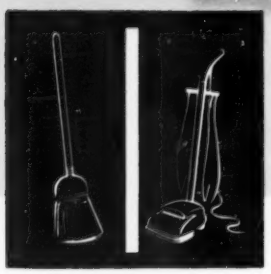
Open end New Britain chuckers provide ample chip clearance and tool accessibility.



Open end New Britain chuckers provide ample chip clearance and tool accessibility.



Interchangeable preset cams provide full range of cross slide feeds on New Britain's new single spindle automatic.

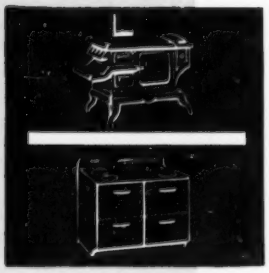


Machines for Making Progress

Try and find a manufactured product that hasn't been made better looking and easier to use than the similar product of even a few years ago.

The most amazing thing about these manufactured goods of today is that they cost the user relatively little more, or no more than they did when manufacturing costs were half what they are today.

The answer is not hard to find if you look inside the factories of leading manufacturers . . . more and more new and better automatic machines, making the most of new materials, and each performing more and more operations with greater speed.



Machines for making progress are the tools for keeping the American economy at record breaking levels of prosperity. Many of these tools are New Britains. Illustrated are three which have provided cost cutting answers to literally thousands of manufacturing problems. Are you using them for all they are worth? Your competition is.

AUTOMATIC BAR AND CHUCKING MACHINES
PRECISION BORING MACHINES
LUCAS HORIZONTAL BORING, DRILLING & MILLING MACHINES
NEW BRITAIN +GF+ COPYING LATHES

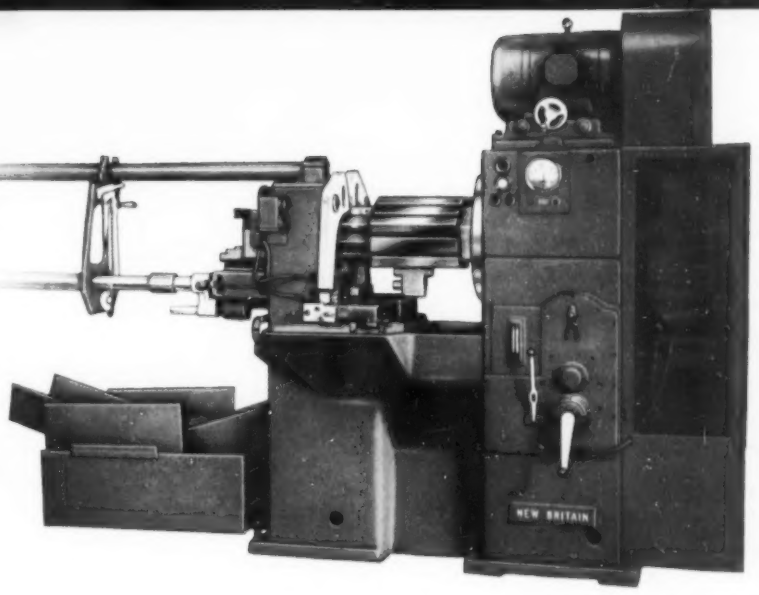
THE
NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division
New Britain, Connecticut

Lucas Machine Division
Cleveland 8, Ohio

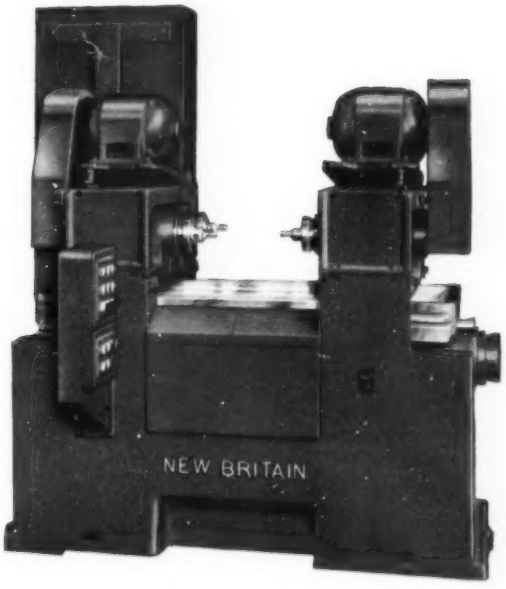
Model 126

A new New Britain single spindle automatic which belongs in almost every turret lathe department – to cut costs on pieces which are on the border line between turret lathe and multiple spindle production. It is remarkable for its mechanical simplicity and simplicity of operation. A new approach in single spindle turning, it incorporates important features which *guarantee* the quick set up essential to economical production and manpower savings, on both short and long runs.



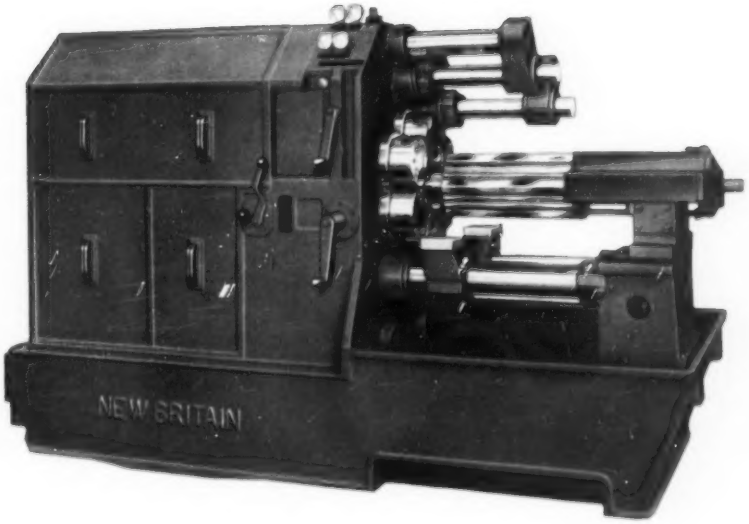
Model 50

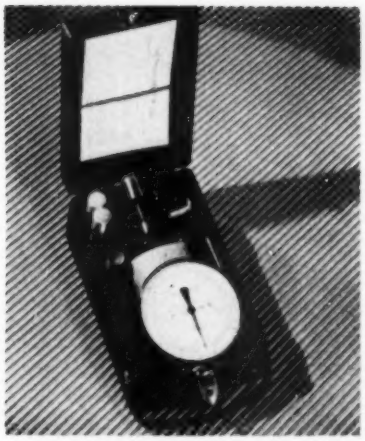
The New Britain double end, tool or work rotating precision boring machine specifically designed for products requiring the most exacting accuracy at high production rates. Tooling set ups and types of pieces machined are practically unlimited. Both double end and single end jobs can be profitably produced on this machine by the use of its automatic cycling features.



Model 675

Six spindle automatic chucking machine. This famous line of New Britain Automatics includes four, six and eight spindle machines, all notable for maximum rigidity, accessibility and permanent accuracy. Open end construction makes tooling, loading, operating adjustments and chip removal simple and easy, reducing down time to a minimum. This, combined with ample power and high spindle speeds, makes New Britain Chuckers outstanding for sustained high production.





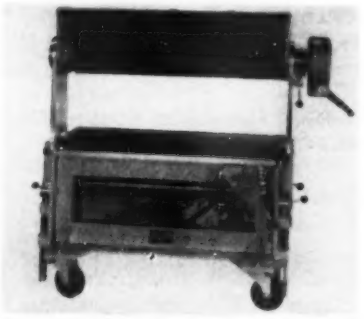
Five-Range Hand Tachometer Has Slip Coupling Overspeed Device

Sticht Universal 5-range hand tachometers are now available with improved slip coupling overspeed device which prevents damage to the mechanism because of accidental overspeeding on the wrong range.

Type UO units are available in four models: 30—12,000 rpm; 45—18,000 rpm; 60—24,000 rpm; and 120—48,000 rpm. Each has five ranges of about 7-in. scale length, or a total of about 35 in. aggregate length, with many hundreds of scale divisions.

Furnished with a full set of accessories and carrying case, including wheel tip for feet-per-minute measurements.

Herman H Sticht Co, 27 Park Place, New York, NY



Hansford Die Handler Motorized Lift Attachment

Hansford die handler, a portable device for taking heavy dies apart, can now be equipped with a motorized lift attachment. The attachment can be installed at the factory or by the customer. Mounting holes are incorporated in all standard models.

The motorized lift drives the upper platen of the die handler at the rate of 16.3 ipm; it is used for rapid adjustment of the upper section.

KELLER Air Tools

for heavy production grinding

ANOTHER EXAMPLE OF
KELLER *Air Tools*
engineered to industry

Direct drive air motor

Light weight and balance

Low air consumption

Less fatiguing to operator

FACTS IN BRIEF
ABOUT KELLER PNEUMATIC GRINDERS

Keller Pneumatic Grinders combine great power with light weight . . . simplify the work of snagging castings, removing fins, dressing and polishing. Their spindles are specially hardened to reduce wear on the double-row bearings.

Keller Grinders have earned an enviable reputation for smooth operation through years of service. Governor maintains a constant speed that saves wear on grinding wheels.

Keller also makes die grinders and vertical grinders

Send for
FREE 16-Page Booklet
for more information and interesting ideas on air tool application

Keller Tool Company, Grand Haven, Mich.
Please send me a free copy of your booklet on Pneumatic Grinding and Cutting Tools

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I-T-E ELECTRO CLUTCH

LARGE LOAD CAPACITY in relation to SIZE

EXTREMELY LOW CONTROL POWER
—24 volts d-c
—allows use of small, dependable control elements

MOUNTS *within* TRANSMISSION HOUSING
—unaffected by oily conditions

ALLOWS CHOICE OF GEAR TYPES
—helical, herringbone, worm—as well as spur

A new element for modern machine tools

This clutch, introduced by I-T-E to the machine tool industry in the United States, has been adopted as standard equipment by many European manufacturers. Torque-size ratios are so favorable that machine designers have freedom in their selection of shaft and tool speed requirements.

Watt consumption for control is so low that relays of highest reliability can be fitted into compact arrangements. Control systems, designed and built by I-T-E, are themselves a valuable contribution for machine manufacturers and for machine tool users.

I-T-E will assist machine builders in applying the I-T-E Electro Clutch to their equipment.

SEND FOR BULLETIN 5306

Useful, over-all information about the I-T-E Electro Clutch and its application will be mailed to you promptly. (Please use your company letterhead when requesting bulletin.)

I-T-E CIRCUIT BREAKER COMPANY

RECTIFIER DIVISION • 19TH AND HAMILTON STS. • PHILADELPHIA 30, PA.

Fine adjustments are made by means of the hand crank. A safety precaution is incorporated which makes it necessary to disengage the hand crank before connecting the motorized lift. Also, the lift must be de-energized before reconnecting the crank.

The motorized lift can be furnished in accordance with JIC regulations. JIC controls incorporate a contactor box on the rear of the machine. In this case the motor operates on 440-v, 3-phase power instead of 110-v.

Hansford Manufacturing Corp, 1239 University Ave, Rochester 7, NY

Hydraulic Tools Cut Bar and Channel Stock

Guillotine Model 20-339 has a cutting capacity up to ½x2-in. flat bar stock or channels to 9/16 x 2 x 3/16 in. Unit is powered by a ½-hp electric hydraulic pump and a 30-ton thrust is provided. Weight of shearing unit is 48 lb; weight of pump unit is 80 lb.

The assembly can be obtained dolly-mounted. For non-production applications and on-the-job cutting the unit can be obtained with a manually operated hydraulic pump weighing 13 lb.

Manco Mfg Co, Bradley, Ill

Clamp-Type Air Cylinder

Air cylinder for vertical or horizontal mounting has 1- or 2-in. stroke, 1⅛-in. bore. Piston rod is stainless steel, with brass piston, and standard O-ring. Bronze bushing guides the piston rod.

Modernair Corp, San Leandro, Calif

CAPEWELL MAKES EVERY TOOTH COUNT

IT'S THE TEETH THAT COUNT!

1881 CAPEWELL

BAND SAW BLADES

CAPEWELL FLEXIBLE BACK, HARD TOOTH BANDS SPEED PRODUCTION! ASK YOUR DISTRIBUTOR

THE CAPEWELL MANUFACTURING CO.
65 GOVERNOR ST., HARTFORD 2, CONN.

Please send me your bulletin on Band Saw Blades.

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Company _____

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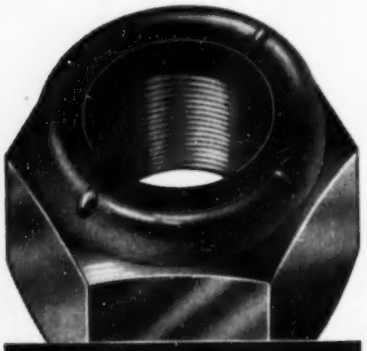
. . or Released in an Instant

Faster assembly . . . no more failures of fasteners. GREER STOP NUTS hold firm against jolts, shocks, shimmy, wobbles . . . any vibration, any kind.

Bolt threads are gripped tightly . . . these famous nuts *never* work loose. Yet an ordinary hand wrench gives instant release. The tough, built-in GREERCOID collar does it . . . and seals against fluid leakage, too!

Study *your* fastener problem. Over 3000 types and sizes. Consult GREER. Proved on thousands of products. Meets gov't and military specifications.

Write
GREER STOP NUT CO.
2620 Flournoy Chicago 12, Ill.



GREER
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF
Stop Nuts

Filter-Lubricator Unit

Filter-regulator-lubricator unit has been introduced by Arrow Tools.

Filter has a porous bronze element which is said to retain a much greater amount of sediment on its outer surface without serious loss of pressure. Air or filtrate enters unit where centrifugal action throws moisture and heavier solids against the bowl and downward into zone below the baffle, where it is deposited. It then goes through the bronze element where even the finest particles are removed; only clean air or filtrate is allowed to pass through. Deposit is removed through drain cock at bottom of bowl.

Lubricator delivers a finely vaporized mist of oil into the air stream; this remains in suspension, providing positive lubrication to precision working parts of air-operated equipment. Lubricator automatically varies oil delivery according to airflow requirements; if more or less oil is desired it may be obtained by varying the elevation of the wick.

Complete unit is obtainable in sizes ⅜, ½, ¾, and 1 in. Various combinations in these sizes may be used where complete setup is not required.

Arrow Tools, Inc, 1900 S Kostner Ave, Chicago, Ill

Vantrol Cleans, Rustproofs Ferrous, Non-ferrous Metals

Alkali-type metal cleaner, Vantrol 5541A, is said to clean aluminum and other nonferrous metals without discoloration or deposits. Also, when ferrous metals are cleaned, rust protection is said to result, even on cast iron.

Type 5541A is an in-process spray-washer cleaner, and is said to be non-toxic, non-inflammable, and low foaming. It is a powder dissolved in water in concentration of 2 to 8 oz per gallon. Operating temperatures vary from about 70 F to 212 F, depending on the difficulty of the job.

Van Straaten Chemical Co, 82 W Washington St, Chicago 2, Ill

need a better finish?

Torrington Swaging Machines—delivering 4000 hammer blows a minute—work out surface imperfections quickly...produce a finish far superior to that obtained by other reduction methods. Swaging improves the quality of the material, too, and utilizes every ounce of stock.

"The Torrington Swaging Machine" describes all the advantages of swaging and gives full details on all Torrington machines. A copy is yours for the asking.

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Specialty Department
553 Field Street • Torrington, Conn.
Makers of
TORRINGTON NEEDLE BEARINGS

Electric Production Screwdriver And Tool Balancer

Mall Tool Co has developed a twin combination—an electric production screwdriver and tool balancer — claimed to be perfectly paired to boost assembly line efficiency. Model ES10 screwdriver has an ac-dc ball bearing motor. Standard voltage is 115 v, but 230-v models are available. Switch is lever type, normally off. The driving clutch engages when pressure is exerted on the bit. Reversing requires a 45° turn on the knurled ring. Operating at 1200 rpm, the disengaging torque may be varied by a simple setting of spring pressure. Capacity is for self-tapping No 10 machine screw or non-tapping ¼-in. machine screw. Butt end of tool has a bail for overhead suspension from tool balancer.

The tool balancer, mounted overhead, holds a 15-ft steel cable in a steel housing. Reel bearings require no maintenance. Tool retracts when released, providing safe handling of equipment. Unit will also take a drill, nut runner, grinder, or other portable tool weighing up to 10 lb.

Mall Tool Co, 7725 South Chicago Ave, Chicago 19, Ill

Heli-Coil wire thread inserts are available in 47 standard sizes. In addition to primary use in original equipment manufacture, can also be used to repair threads damaged during manufacture and during use. Stainless steel inserts are said to provide higher loading strengths and greater resistance to wear, vibration, seizing, galling, and corrosion than unprotected tapped threads.

Heli-Coil Corp, 1330 Shelter Rock Lane, Danbury, Conn

Here they are!

The new WENDT-SONIS *Carbide* BLANKS

Wendt-Sonis now adds a brand new line of carbide blanks to its complete line of cutting tools.

Eight styles are available including reamer blanks, solid round blanks and center tips. A wide variety of grades, sizes are also available.

Research and on-the-job testing have proved that these new Wendt-Sonis carbide blanks reduce production costs.

Write for new "Tooling Tips" folder, containing complete details and prices for the new carbide blanks. Send a post card to Dept. S1.

WENDT SONIS

HANNIBAL, MISSOURI

576 N. Prairie Ave.
Hawthorne, California

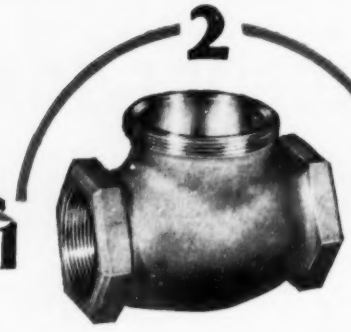
549 W. Randolph
Chicago, Illinois

THE MOST COMPLETE LINE OF CARBIDE CUTTING TOOLS AND BLANKS

ONLY

GOSS and DeLEEUW AUTOMATIC CHUCKERS

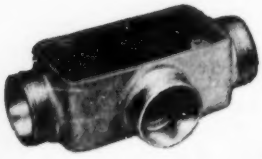
offer the 1-2-3 feature

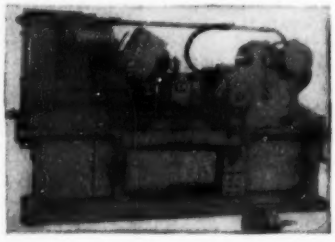


This NEW development—unsurpassed for speed, convenience of tooling and precise finish—involves no retooling problem even for short runs. It assures greater production at lower cost on all classes of work.

The unique "1-2-3" feature, exclusive with Goss & De Leeuw, provides the means for performing one to three right or left hand single or double threading operations simultaneously or in sequence, without changing set up.

Here's an ideal machine tool for small lot requirements because of quick, easy changeover. Any class of chuck work can be handled economically in any quantity.





The examples of work shown here are typical of the wider variety of parts being produced on these new machines.

SEND FOR detailed information on this new machine. Let us have samples of your work in order to give you time and cost estimates for handling it on the "1-2-3" Goss & De Leeuw.

GOSS & DeLEEUW QUALITY PRODUCT QUANTITY

GOSS and DE LEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

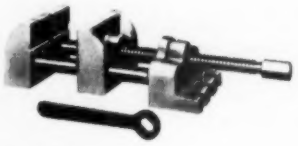
Accessory Set Widens Uses of Webber Standard Gage Blocks

Accessory set designed for use with Webber standard gage blocks permits blocks to function as a tool, as well as a standard of measurement. Units can be combined into build-ups to serve as snap, ring, or height gages, calipers, and scribers for every dimension under 12 in.

Standard Gage Block Accessory Set No. 11 consists of 4 gage block clamps, capacity 12, 6½, 4, and 1½ in., plus a pair of 0.250-in. straight jaws, a pair of 0.250-in. half round jaws, center point, scriber and base block. These can be combined with the blocks to produce a variety of precision gages for layout and inspection work.

Set is sold separately or in conjunction with steel or carbide 84, 43, and 38 block sets.

Webber Gage Co., 12900 Triskett Rd, Cleveland, Ohio



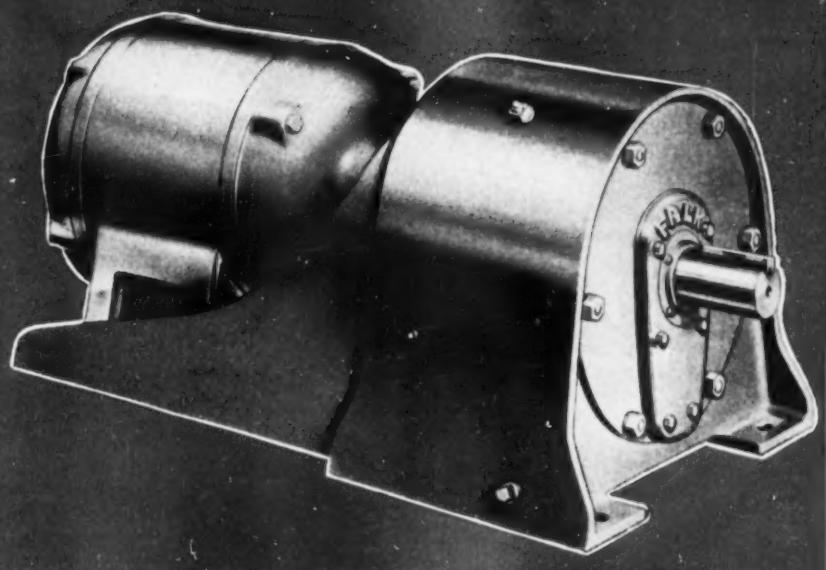
Wilton Machine Vises

Complete line of drillpress and machine vises in jaw widths of 3, 4½, and 6 in. is available from Wilton Tool Co. Simple design, eliminating dead weight, makes them available at moderate prices.

Since all sides are fully machined, they may be used flat, or on either side, eliminating need to remove work. Jaws have vertical and hori-

Choose the All-Motor type,

ALL-STEEL FALK Motoreducer



...with complete foot-mounted motor of ANY make ANY type ANY speed

Its exclusive, superior features mean LONG-RANGE ECONOMY!

You get more for your money in a FALK all-steel, All-Motor type Motoreducer. Here is the *only* compact motorized reducer with a separate foot-mounted, resilient Steelflex coupling-connected, standard motor without modifications! It accommodates *any* make, type, or speed of motor within the AGMA rating of the unit. Ratio can be changed within torque capacity of unit without modifying motor.

The simplified construction of the FALK All-Motor type Motoreducer means real long-range economy. Motors or reducer units can be quickly and easily interchanged from one line or plant location to another. Fully standard replacement motors from manufacturers' field stocks are always available without costly delivery delays or special motor or shaft modifications.

When you choose a FALK All-Motor type Motoreducer, you get the utmost in design, versatility of performance, and utility—plus the greatest possible dollar-for-dollar value throughout its traditionally long life... Available in any standard ratio from factory and distributor stocks throughout the country. Write for Bulletin 3104.

FALK ...a good name in industry

THE FALK CORPORATION 3001 W. Canal St. Milwaukee 8, Wis.

Every FALK motoreducer has these "IN-BUILT" FACTORS

1 **All-steel Housings.** Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.

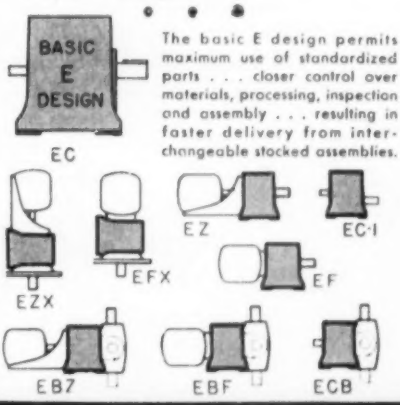
2 **Streamlined inside and outside.** Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

3 **Sealed Housings.** Dual closures and one-way vents keep oil *in*, dust and moisture *out*. Units are splashproof, leakproof, dustproof.

4 **Positive Lubrication.** Large sump capacity ...oil-tight construction assures clean lubricant...direct dip of revolving elements provides positive lubrication at all speeds.

5 **Wide Speed Range.** Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

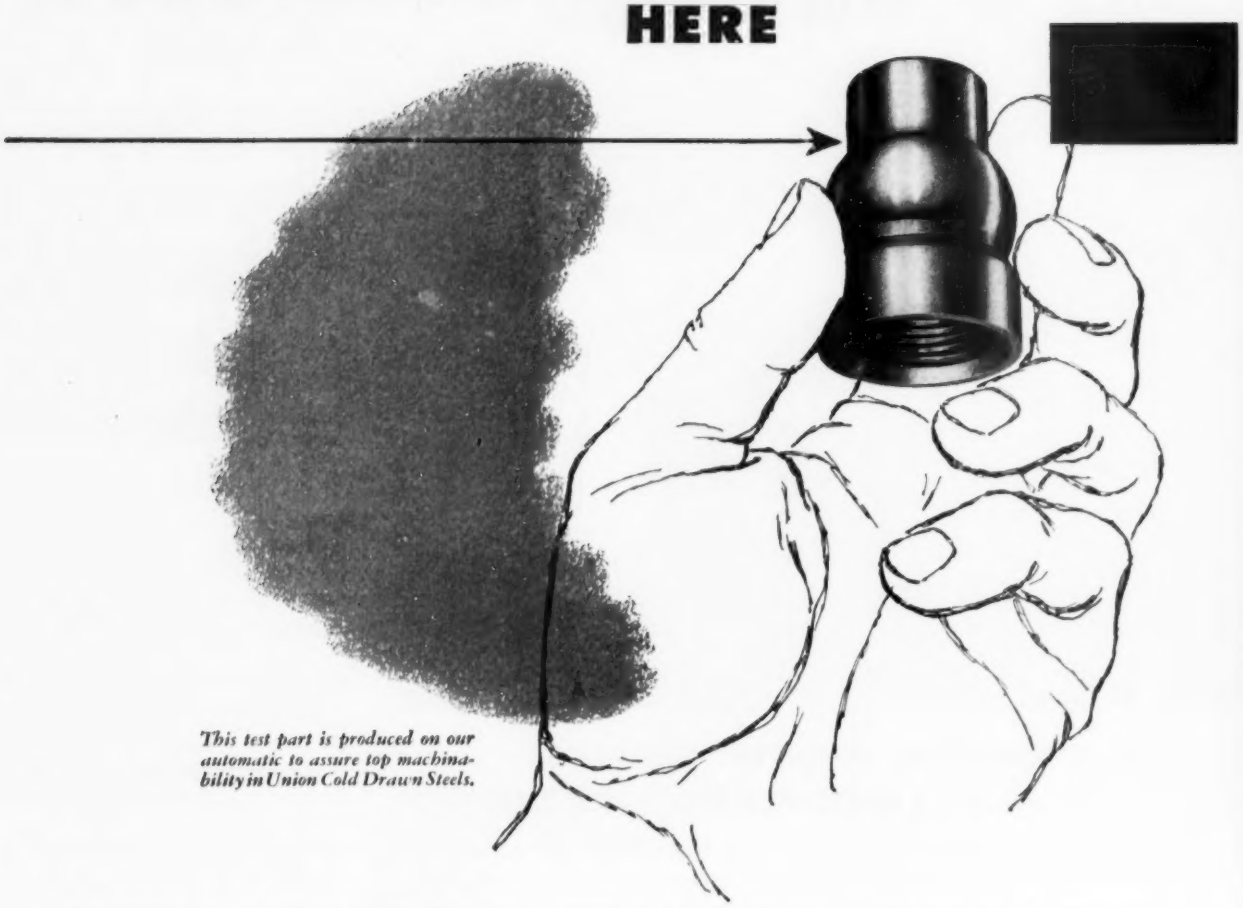
6 **Precision Gearing.** Heat-treated alloy steel, precision cut and shaved helical gearing throughout...quiet-operating crown shaved pinions...taper bored gears for easy ratio changes.



The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.

WRITE FOR BULLETIN 3104

PRE-TESTED MACHINABILITY HERE



This test part is produced on our automatic to assure top machinability in Union Cold Drawn Steels.

What we learn about Union Cold Drawn Steels on our automatic screw machine at Massillon, Ohio, helps you make a better product at a better profit when you cut those steels on *your* automatics.

That's why Union Drawn's "Pre-Tested Machinability" idea keeps set-up men and operators happy when they're running Union Cold Drawn Stock . . . they get set-up sooner, with fewer headaches, using the best combinations of feed and speed. There are more parts in the shipping pan, fewer parts in the reject box. Profits stay up, costs stay down.

And it's all because we have an automatic! It runs all day long, doing the six most common operations on the useless part above. Useless to everybody except to us at Union Drawn . . . and to you who use Union Cold Drawn Stock.

Our Union Drawn Field Metallurgists would welcome the chance to talk with your set-up man, swap hints on tool angles, heavier feeds, faster speeds. When shall we call?

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

REPUBLIC STEEL

6 HELPFUL MANUALS

filled with how-to-do-it information and data to help you use Union Cold Drawn Steels. Write for "Union Drawn Pocket Library."

Republic UNION COLD DRAWN STEELS

Free-Machining Bessemer, Alloy and Endure Stainless Steels

•

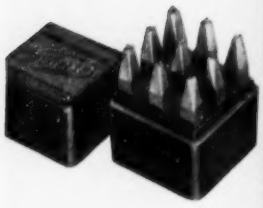
Union Cold Drawn Special Sections

•

Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting.)

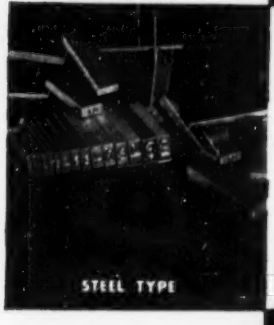
Parker Marking Tools make FIRST impressions LAST!

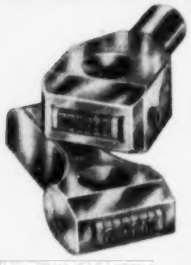
EVERY PARKER MARKING TOOL AND DIE IS BUILT TO GIVE CONSISTENTLY SUPERIOR SERVICE—PERMANENT, RAZOR-SHARP IMPRESSIONS DAY AFTER DAY, JOB AFTER JOB IMPROVE PRODUCT QUALITY, ASSURE PRODUCTION ECONOMY!

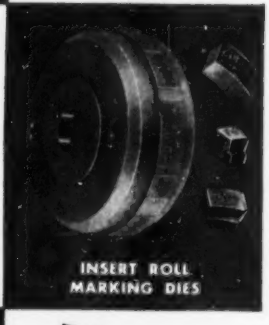

STEEL NUMBER SETS

STEEL LETTER SETS

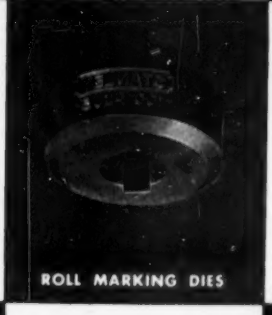
STEEL HAND MARKING DIES

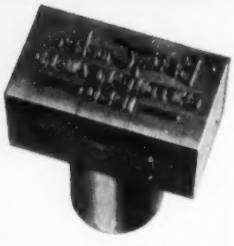

STEEL TYPE


TYPE HOLDERS


INSERT ROLL MARKING DIES

CODING TYPE


ROLL MARKING DIES


PRESS MARKING DIES

HOT STAMPING DIES

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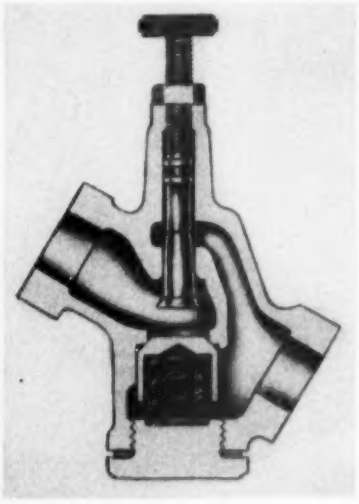
MARKING, DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

by Parker

zontal V-grooves for clamping of rounds.

Two slide bars are made of heavy-gage cold rolled steel for strength and smooth travel. Removable hardened steel jaw plates are available at extra costs. The 6-in. vise has removable crank handle; 4½-in. model has slide bar handle in addition to hex-head for wrench tightening.

Wilton Tool Manufacturing Co, 925-941 Wrightwood Ave, Chicago, Ill



Speed Control Valve

Ross speed control valve can be used wherever it is necessary to control the flow of air. It provides split-second timing of piston movement by positive control of airflow. The valve can be mounted in any position between the operating valve and one or both ends of a cylinder to provide airflow adjustment.

Ease of adjustment is accomplished by the many turns provided on the adjusting stem. The orifice controlling this flow can be quickly adjusted from practically zero to wide open.

The poppet is the only moving part of the valve. The unit is designed for ease of maintenance and can be disassembled without breaking the line connection. It is available with ¼, ⅜, ½, ¾, 1, and 1¼ ipt.

Ross Operating Valve Co, 120 East Golden Gate, Detroit 3, Mich

Work-O-Matic material handling tray for use with fork-lift trucks collects, stores, transfers and dumps hard-to-handle materials. Seven-gage steel tray is open at both ends to permit materials to overhang. For dumping operations, operator selects discharge point which remains constant throughout entire cycle.

The Union Metal Manufacturing Co, Canton, Ohio

Sureweld Shop Welder

National Cylinder Gas has redesigned its Sureweld ac shop welders. The four-coil transformer now has the coils positioned vertically, resulting in better ventilation. Insulation has been improved by the use of double-glass insulated magnet wire for primary and secondary windings.

The movable magnetic core section, which permits stepless current adjustment, has been positioned laterally, allowing the control lever to be moved from the top to the front of the case.

Two models are available—one with a welding range of 25 to 295 amp, with and without pf correction; the other with a range of 20 to 180 amp.

National Cylinder Gas Co, 840 N Michigan Ave, Chicago 11, Ill

Power Lift Models Added to Skid and Pallet Low-Lift Line

Skid and pallet low-lift trucks manufactured by Knickerbocker's Truck-Man division are now available with automatic hydraulic power lift.

Hydraulic pump, installed directly on the engine, transmits pressure up to 1000 psi through a 360° swivel elbow fitting and flexible tube to the cylinder. Fitting is a design which has proven satisfactory on high-speed presses and many similar heavy-duty machines, permitting full 360° rotation of the driving and steering power turret.

Pallet toter is designated Model DFP. Skid lift Model DHP is a heavy-duty design of 4500-lb capacity; available with hand jack, if preferred.

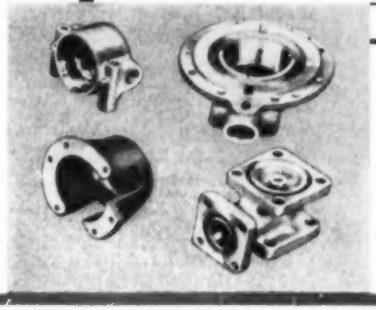
Knickerbocker Co, Truck-Man Div, Detroit, Mich

Off on a Carefree Vacation!

He just contracted with Vinco to produce component parts.

This confidence in Vinco is typical of many manufacturers from coast to coast. They have learned that whether the parts to be produced have close or loose tolerances, these parts will be delivered as specified, at a minimum cost and with a minimum of scrap.

VINCO CORPORATION
9125 Schaefer Hwy.
Detroit 28, Mich.



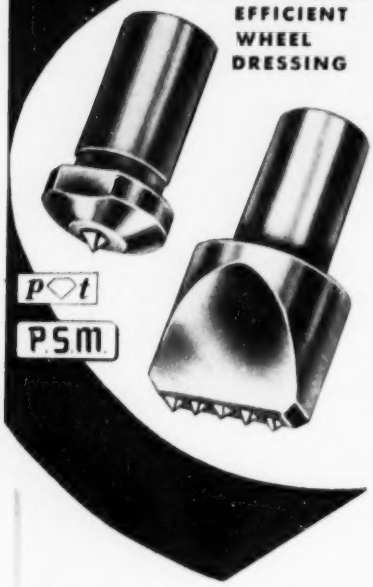
Mass Produced Parts
Gears
Gear Pumps
Spline Gages
Aircraft Gears

VINCO
MILLIONTHS OF AN INCH FOR SALE

THE TRADEMARK OF DEPENDABILITY

PRECISION DIAMOND TOOLS

FOR LOW COST EFFICIENT WHEEL DRESSING



Tools engineered for your dressing problems. Fast Service — delivered from stock. Write for catalog or send your special requirements to our engineering staff.

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Cedar Rapids, Ia.—Allen Supply Co.
Dallas, Tex.—Engineering Sales Co.
Dayton, Ohio—Hayes Tools, Inc.
Flint, Mich.—Clinton M. Bohlen
Houston, Tex.—Engineering Sales Co.
Indianapolis, Ind.—Laidlaw Sales
Milwaukee, Wis.—Western Iron Stores Co
Minneapolis, Minn.—John C. Eide Co.
New York, N. Y.—E. R. Loshak
Omaha, Neb.—Fuchs Machine & Supply Co
Pittsburgh, Pa.—Wm. Stophel
Rochester, N. Y.—George Maya
Rockford, Ill.—Nelson & Storm Tool Supply
St. Louis, Mo.—Dolph Baettler
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Shreveport, La.—Dixie Mill Supply Co.
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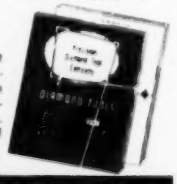
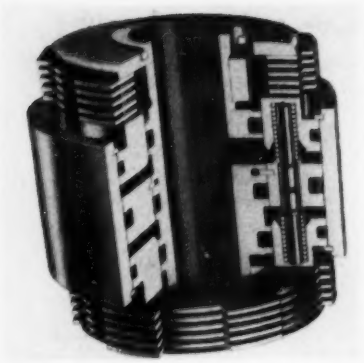
Wichita, Kan.—Wesco Industrial Supply Co.

Just Released! 2 new catalogs that cover the complete Precision line — Precision Diamond Tools and Precision Diamond Wheels. Write to Factory today!



PRECISION DIAMOND TOOL CO.
ELGIN, ILLINOIS



Twin Disc Oil-Actuated Multiple-Plate Clutch

Oil-actuated multiple-plate clutch, designed to provide higher and more constant torque capacity, incorporates an integral oil cylinder to clamp the plate stack. Extensive use of snap rings is employed to provide easy disassembly.

Advantages claimed by the manufacturer are threefold. The most obvious is the fact that no adjustment is required to compensate for friction plate wear because the floating or pressure plate is the ram of the cylinder. As the plate stack wears, the ram travel increases automatically. Second, it is often possible to use a smaller clutch because constant torque capacity is assured. The oil-actuated design permits the torque capacity to be directly proportional to the applied oil pressure, since this pressure creates the clamping force. Third, the oil-actuated design offers advantages where remote control is desired. This clutch needs only selector valve and seal.

Twin Disc Clutch Co, Racine, Wis

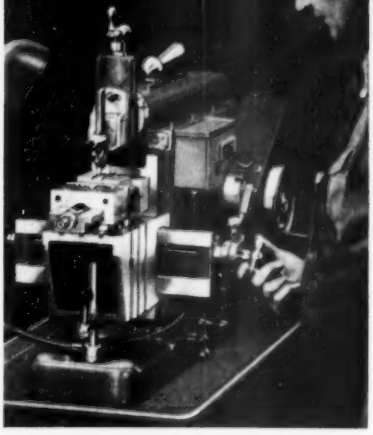
Model 220 B is a six-power, semi-achromatic, sharp focus magnifier. Equipped with a 1¾-in. undistorted lens area from two 2-in. plane-convex lenses. Sufficient light is concentrated on object from any adjacent good lighting.

Larrimore Sales Co, Mfg Div, PO Box 1234, St Louis, Mo

Lensetter Model 230 is a tool for picking up lenses and similar objects and placing them into deep cylinders and cavities. Suction cup in one end adheres to any smooth, flat surface, and most convex or concave surfaces; smaller cup in upper end controls holding or release of suction grip.

Larrimore Sales Co, Mfg Div, PO Box 1234, St Louis, Mo

SOUTH BEND 7" SHAPER



Cuts Cost OF MACHINING SMALL PARTS

It's fast — accurate — easy to operate. The South Bend 7" Precision Shaper can consistently give you low machining costs on small parts. Designed to handle a wide variety of work, it will enable you to release larger shapers for heavier jobs, save on machine investment and economize on both power and upkeep. Find out how this versatile shaper can give you better service on production, toolroom or maintenance machining. *Write for literature.*

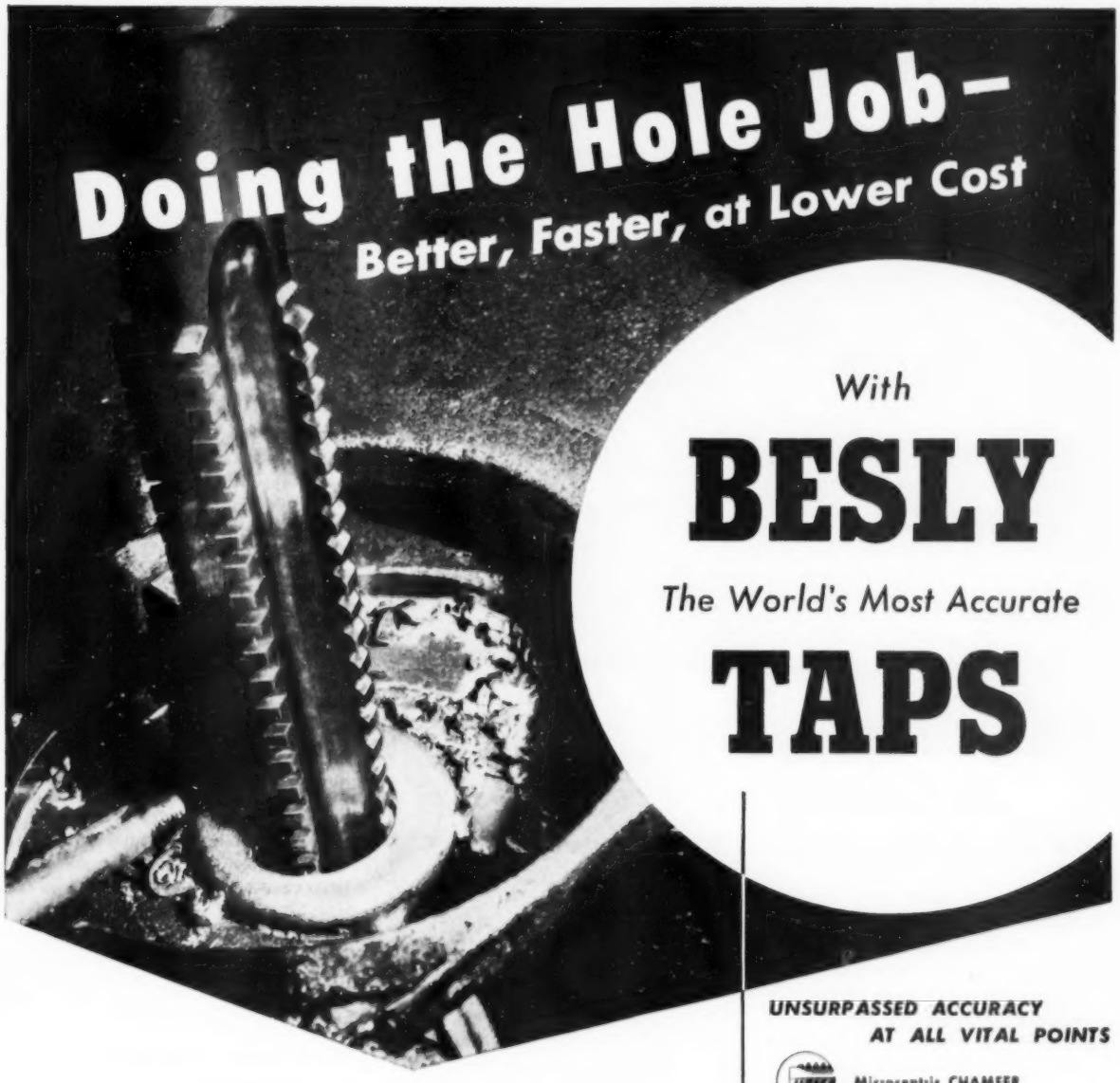
SPECIFICATIONS

RAM Stroke — 0 to 7". Strokes per minute (4)— 42 to 195. Cutting speeds—3 to 114 per minute.
TOOL HEAD Vertical feed — 3". Swivels 360°. Tool post slot size—3/8" x 13/16".
TABLE Horizontal travel—9½". Vertical travel —5". Power cross-feeds (6)—.002" to .012". Ram clearance—1/2" to 5-1/2". Table size—6-5/16" x 5" x 5-3/8".
VISE Jaw width—4". Jaw depth—1". Maximum opening—4".

SOUTH BEND LATHE
SOUTH BEND 22, INDIANA
Building Better Tools Since 1906

South Bend MACHINE TOOLS

Doing the Hole Job—
Better, Faster, at Lower Cost



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BESLY

The World's Most Accurate

TAPS

UNSURPASSED ACCURACY AT ALL VITAL POINTS

- Microcentric CHAMFER
- Solid-Ground THREAD FORM
- Accurate RAKE ANGLE
- Mirror-finish FLUTES
- Tru-Square DRIVER

● LET US PROVE that Besly can help you get better threaded parts, longer tap life and lower tapping costs. Ask your authorized Besly Distributor for a TRIAL RUN on your toughest jobs . . . PLUS details on Besly's Super-Service on "Specials".

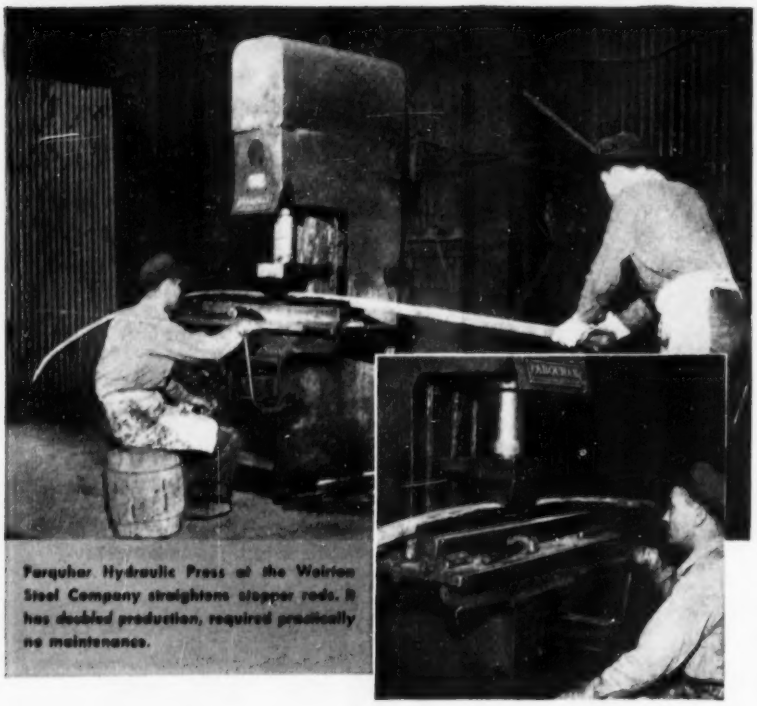
TAP TIPS The handy "Handbook for Tap Users" is full of information on tapping methods and tap selection. Write for your Free Copy.

BESLY DRILLS, REAMERS AND END MILLS— High-Speed Cutting Tools in a complete range of types and sizes.

BESLY-WELLES CORPORATION

Established as Charles H. Besly and Company in 1875

120 DEARBORN AVE. • BELOIT, WISCONSIN



Farquhar Hydraulic Press at the Weirton Steel Company straightens stopper rods. It has doubled production, required practically no maintenance.

Farquhar Hydraulic Press

at the Weirton Steel Co.

"eliminates breakage of rods...increases production 100%"

The Weirton Steel Co., Weirton, W. Va., formerly straightened stopper rods with a steam hammer. The operation was slow and resulted in a high percentage of breakage. Seeking a better method, Weirton officials bought a Farquhar Press to speed production. Not only has the press increased production 100%, but it has eliminated breakage of rods. In addition, Weirton reports that in the six years this press has been operating, "practically no maintenance has been necessary."

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in modern production! Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on the moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost.

Farquhar engineers are ready to help solve whatever production problem you may have. Send for free catalog showing Farquhar Built-for-the-Job Presses in all sizes and capacities. Write to THE OLIVER CORPORATION, A. B. Farquhar Division, *Hydraulic Press Dept.*, 1506 Duke St., York, Pennsylvania.

Farquhar

HYDRAULIC PRESSES

for Bending • Forming • Flanging • Straightening • Assembling • Drawing
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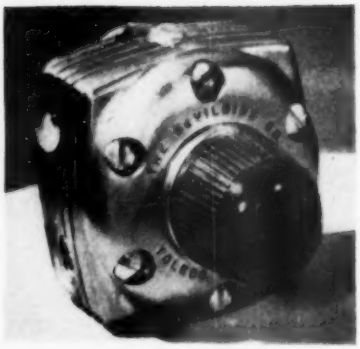

Air Regulator Has Low Pressure Drop

DeVilbiss HAA air regulator reportedly handles a large volume of compressed air with minimum pressure drop. The regulator has a capacity of 80 cfm at 100-lb line pressure. It is said that the unit achieves more sensitive control and reduced pressure losses by using air pressure against the regulating diaphragm instead of the conventional spring-loaded diaphragm. This feature makes adjustment of the control knob easier when regulating air pressure. Airflow increases with demand without affecting the set pressure.

The maximum pressure which can be regulated is 135 psi and company engineers have set maximum line pressure at 300 psi. The unit is 3x4½ in. Price: $19.30.

The DeVilbiss Co, 300 Phillips Ave, Toledo 1, Ohio

Electro-Snap 8-Terminal Precision Switch

Instantaneous switching of two circuits with different characteristics is accomplished with Electro-Snap's recent development. Reaction principle of one circuit snaps the pole of the other circuit.

Case dimensions of 1½ x ⅞ x ½ in. are believed by the manufacturer to be the smallest of its type. Rating is 15 amp at 125/250 v ac, 10 amp at 30 v dc. Simultaneous action permits all four contacts to be wired as a single-pole high-voltage dc switch, to 110 v dc, 20 amp.

As many as four circuits can be operated simultaneously, using the eight terminals. Three-phase machinery can be reversed with this switch, since the wiring can break or reverse two windings of a three-phase motor.

Electro-Snap Switch and Mfg Co, 4220 W Lake St, Chicago 24, Ill

Oil-Dri absorbents for industrial floor maintenance can be recommended for individual problems through expanded field service program. Thorough study of floor conditions is made without cost by company representative, and most practical solution advised for cutting losses from accidents and maintenance.

Oil-Dri Corp of America, Chicago, Ill

Micro FR188 flanged instrument bearing has straight rather than tapered OD, refined processing to super-precision tolerances, and a two-piece, cone-controlled, cylindrical-pocket, pressed metal cage. Designed for low and uniform running torque and quiet operation. Available in all-stainless steel and SAE-52100.

New Hampshire Ball Bearings, Inc, Peterborough, NH

New model Wheel-Ezy hand truck has single or double curved handles for convenient grasping and perfect balancing with all types of loads. Open-nose unit has a beveled edge for easy sliding under cartons, cases, crates, eliminating need for rocking stacked materials to introduce or remove nose of truck. Model, which handles loads up to 500 lb, is equipped with a step-climber.

The Rapids-Standard Co, Inc, 342 Rapistan Bldg, Grand Rapids, Mich

Three non-combustible safety solvent products have been introduced to replace carbon tetrachloride in specialized fields of cleaning. All are of comparatively low toxicity and have high evaporation speed. Cineclene M-5 cleans metals prior to brazing; Oxylene M-6 cleans metals prior to micro and spectroscopic analysis, and critical brazing operations with silver and semi-precious metals; Furfasol M-17 replaces acetone in cleaning adhesive products from process equipment.

John B Moore Corp, PO Box 3, Nutley, NJ

Heavy-duty caster and wheel assembly is a 12-in. dual-suspension, shock-absorbing unit designed for smooth load-glide over uneven surfaces. Light-weight unit has a load range of 2000 lb, is made of No. 356 heat-treated aluminum alloy, with Timken bearings, and life lubrication.

Aerol Co, Inc, 2424 San Fernando Rd, Los Angeles, Calif

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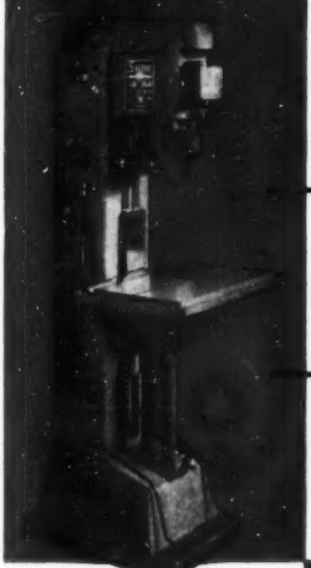
SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR!
3800 PER HOUR!
2500 PER HOUR!

For Top Production



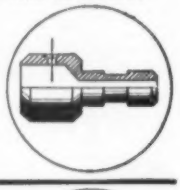
SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

DRILLING

Crossdrill and C"I" Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

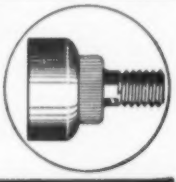


TAPPING

Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING

3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

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Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

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Die Steels—Hot Work and Shock Resisting Steels
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Delta Crescent 20" Band Saw

Proof of Acceptance . . .

Delta-Crescent has joined the ranks of *leading* band saw manufacturers using CARTER Jiffy Tires as standard equipment because . . .

- *Jiffy Tires can be changed in 10 minutes*
- *Provide 2 to 4 times more wear*
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- *Jiffy Tires are safe . . . won't throw at any speed*

Available only through Band Saw Manufacturers.

CARTER PRODUCTS COMPANY, INC.

429 Wm. Alden Smith Bldg. 30 Ionia Ave., S. W.
Grand Rapids 2, Michigan

A MODERN TIRE FOR A MODERN SAW

Springless dial-type Detecto crane scale has fixed-center construction to prevent misalignment of parts despite rough handling and shock loading. Unit is protected by a 25% overload safety factor. Steel plate, fastened to lower swivel hook, catches and holds load against steel housing, eliminating possibility of dropping. Two models available: one for high-ceiling areas, the other for low headroom operation.

Detecto Scales, Inc, Brooklyn, NY

Circle B synchronous motors, known as S-200 series, are designed for applications where extremely low speed at light loads is required. Available at speeds from 10 revolutions per hr to 1 per month. Has additional exposed low-speed gear train and will handle continuous load up to 1 in-lb; unit is 2 in. in dia by 1⅝ in. deep.

Bristol Motor Div, Vocaline Co of America, Inc, 203 Coulter St, Old Saybrook, Conn

Loadstar 4207 trolley conveyor has wheel made with steel or felt seals with inner and outer races hardened. Balls are of chrome steel retained in pressed-steel cage; outer ball races are ground. Standard bracket for the 4-in. conveyor is the TB-4351; hooks, trays, or any other type of load carrier can be applied to the X-458 chain.

Mathews Conveyor Co, Ellwood City, Pa

Overload release clutch for sprocket, chain, belt, and gear drives has instantaneous trigger action and is designed to allow machines to resume operation at exact cycle point of release. Works within very close limits and can be used over a wide range of speeds and shaft sizes.

Overload Release Clutch Co, Dept E, 1162 Stuyvesant Ave, Irvington, NJ

Driv-Lok studs for speeding attachment of light metal or plastic parts to heavier structural members require only light blows to drive and secure. Available in round, flat, and countersunk head styles in lengths from ⅛ to ½ in. and shank diameters from 0.067 to 0.250.

Driv-Lok Pin Co, 715 Chauncey St, Sycamore, Ill

Pangborn Rotoblast barrels, type GN, have added two models. Sizes are 3 cu ft and 18 cu ft. Barrels have same general features as other GN models (*AM—Aug 4, '52, p 174*).

Pangborn Corp, Pangborn Blvd, Hagertown, Md

ROUND TABLE Discussion

LAMBS OR GOATS?

Will company dinners and similar entertainment tend to bring workers and management into closer understanding, or will the men feel their after-hours are being invaded?

THE IDEA of a company-paid banquet for one department in order to improve personnel relationships is bad in every aspect.

In the first place, one particular department is being singled out for special attention. The first reaction by other men and their foreman would be one of curiosity as to the why's and wherefore's of this special treatment. After they have found out by one means or another that the banquet is to improve personnel relations, they will want to know when their department is going to get a similar deal. And there you have a practice which must be carried out throughout the company. If it is not, the questionable gains in harmony within the one department will most certainly be more than offset by the loss in harmony in those departments which might feel that favoritism was being shown. I can just hear one of the fellows saying, "Well I'll be damned. If you have to have fights and arguments to get a free dinner, I can fight and argue with the best of them." Multiply this by the number of rugged individualists normally present in any organization, and you will have a real turmoil.

The second point to be considered is what about the men who have other obligations? The dinner admittedly is not to be an official function, and no official information or policies are to be discussed. What, then, is the position of a man who thinks more of his bowling, poker party, bridge club, or fraternal organization than he does of attending a departmental dinner? He has no obligation to go if he chooses not to, but how will his foreman react to his absence? His not being at the dinner will in no way affect his work, yet there is a possibility that his foreman will resent it and consider him uncooperative. In this case, the dinner would have been a cause of resentment and ill will, rather than the opposite.

The third factor is that even though the avowed purpose is good

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PRATT & WHITNEY

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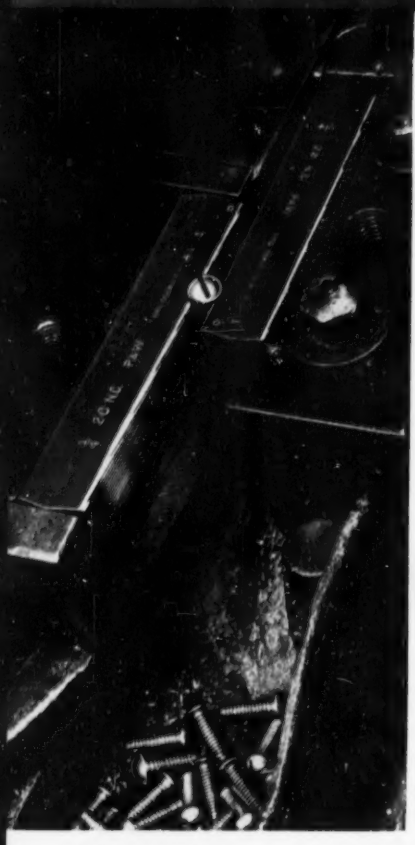

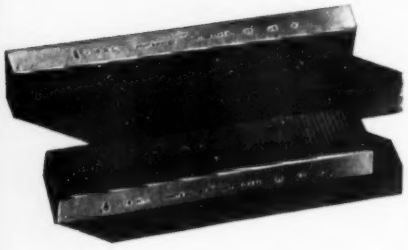

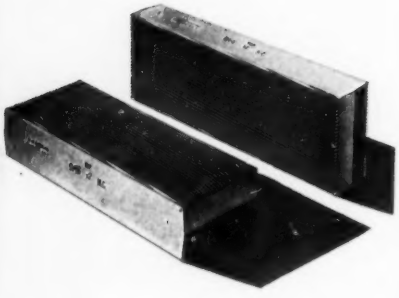

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Take advantage of the comprehensive stocks of standard dies for Waterbury-Farrel, National Boltmaker and Manville machines that we maintain to meet your needs for prompt service. Special dies are made to your specifications.

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MACHINE TOOLS • CUTTING TOOLS • GAGES

will, those with a suspicious or cynical attitude will not believe it; they will suspect the company of being guilty of everything from paternalism to anti-union activities. With most business, a dollar spent must show a profit from the goods produced. Emphasis is placed on improved production and savings of time and material. Naturally, unless it is the custom, a man will view with suspicion any sudden philanthropic and benign gesture by management.

Lastly, if there is any deep-seated trouble, companionship over the dinner table won't cure it. It may cover the trouble temporarily, but if the causes are not corrected it will spring up again. The better course of action would be to spend an equivalent amount of time and money in the improvement of working conditions and the elimination of the sources of any possible irritation.

In conclusion, I would state that top management should look at this problem from an overall company viewpoint and work out an all-inclusive approach to the problem rather than take this ill-advised step.

R E Moulton
Huntington Park, Calif

•

IF THE BOSS feels he must do something to improve harmony in one department, or in his entire shop, there must be a reason for it.

Why doesn't he try to find out the cause of the alleged unrest before he invites his men to a Saturday night supper? If there are any serious grievances against anything in any of the departments, a supper of the kind suggested won't remedy the trouble—not even after the boss has made his speech and paid the bill—unless he promises to investigate the matter.

Suppose that Al himself is handling his men so badly that they wish he were dead, or that he were removed from his job; I once heard two men exchanging thoughts to that effect—I don't think the men would be any more satisfied after the supper than before it.

But this doesn't say that a meeting of the type mentioned would be valueless. On the contrary, if the boss is wise enough to try to appraise himself of the mental conditions under which his men are working, then he has an excellent opportunity. Under such circumstances, he might get more and better information than he could get through conventional channels.

A social get-together might be a good thing for all concerned if it is

arranged in an honest and friendly way. If, on the other hand, it is a meeting called to find how far the goats might be driven without too much noise (the lambs are always on the company's side) it will to all purposes miss its aim.

In any group of men there are always some who might be called lambs and others goats. If the boss wants to distinguish between them for the purpose of getting rid of the goats and restoring harmony, the quieting effect anticipated from the meeting would be spoiled. The right thing for the boss to do would be to try to find out why Jones and Rigdon are lambs and why McCarty and Greenard are goats.

Demanding that Tom O'Hara and Ed Harris sit together, even if they are enemies, is very foolish and won't add a bit toward better harmony. Instead, why doesn't Al try to find out the reason for the antagonism between the two men; perhaps then they would shake hands and sit together on their own accord.

If the boys smell a rat, and start thinking the boss is trying to put something over on them, it must be due to some dishonesty in other fields. Why shouldn't he make a speech? Don't his men want to know something about the policy he is going to follow in the future? If the men don't trust their employer he must have forfeited their confidence at some time; this is the moment when it might be corrected.

I think company entertainments for the working force—staff included—can never go too far. All sorts of activities, too numerous to be counted here, might be included. The men will not resent management's wish to become more friendly, but management should go to the bottom of things to find out the reason for any trouble it suspects—dinners or suppers are secondary means.

A E Fristedt
Stockholm-Bromma, Sweden

"——— —Yes?"

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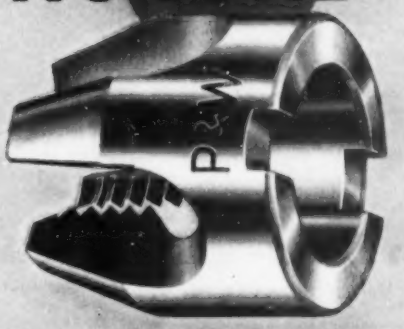

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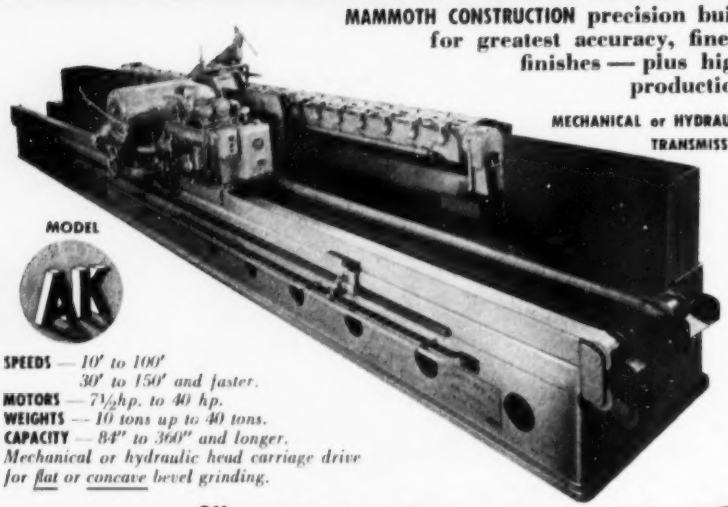

MODEL AK

SPEEDS — *10′ to 100′ 30′ to 150′ and faster.*
MOTORS — *7½hp. to 40 hp.*
WEIGHTS — *10 tons up to 40 tons.*
CAPACITY — *84″ to 360″ and longer.*
Mechanical or hydraulic head carriage drive for flat or concave bevel grinding.

Other Models. **GK — medium heavy duty** — *capacity 32″ to 184″*
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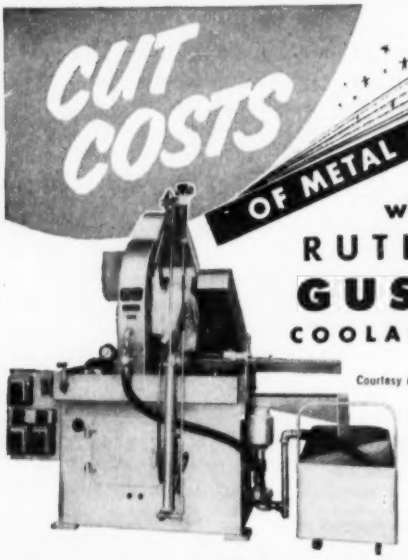

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You get instantaneous coolant flow, as much or as little as you need. The heavy duty prelubricated ball bearings, dynamically balanced rotating shaft with no metal-to-metal contact within the impeller housing gives you a long trouble-free life for your gusher. Write us today.

THE RUTHMAN MACHINERY CO.

AFTER A LIFETIME of experience with suppers and get-togethers of the type Al proposes, I must say that I do not believe they will be very much of a success. In theory, maybe the big boss and the men can sit down together and imagine they are equal, but let's not kid ourselves; it ain't so!

Over 50% of the men will resent the dinner. Some of this resentment will be due to the fact that the spread takes place on Saturday night, and therefore interferes with the usual activities of many of the men: going to the movies, bowling, drinking, or whatever they do that night. Some of the men will resent the fact that money is being spent for a dinner instead of a raise for them personally. Their attitude will be that of the late Samuel Gompers who was well known for his dislike of welfare work; Sam called it "hellfare" work, and stated on many occasions: "Put your welfare money in our pay envelopes, and we'll take your good wishes for granted!"

You must realize that the idea of a get-together for the purpose of improving personnel relations is strictly a management promotion, and is not an idea that would ever occur to the great rank and file of the workers. Even if you told the great bunch of workers what the purpose was, they wouldn't believe it; they would be looking for the catch in the form of a proposed speed-up, or a rate cut, or some other gimmick. The majority of us have been outsmarted by experts in our time, and we don't intend to let any scissorbill repeat the trick. We look at the idea of a free feed with a jaundiced eye.

Let's just look at this proposed supper through the eyes of the men. As a starter, it is safe to presume that the affair will be "dry." Most of these affairs are of that type. Re-

gardless of the number of Scotch and sodas the boss may usually have at the local Athletic Club when he is with his own cronies, he wouldn't think of proposing the same setup when he steps out with the men. And the men know that, too, and resent it. But let's go a step farther. The supper boils down to a company dinner on a Saturday night, plus the added detraction of a dry company dinner on a Saturday night, plus the further and supreme detraction of a dry company dinner on a Saturday night with the big boss present. That's a "No Prize" package in any man's language, and adds up to just one thing—a cheap stunt to get the men to work one night without pay. Of course it won't be popular.

With a little different handling the purpose might be accomplished. I'd suggest that a moderate amount of beer be provided for those who want it, and I would insist that hard liquor be absolutely barred. It may be that as many as twenty people can be collected in one group, and each of the twenty be endowed with that unknown quantity—the ability to handle their liquor. I've never met that group, and I never expect to, so let's insist that there be no hard liquor. And I'd bar card games, too. Just why it is so I wouldn't know, but whenever three men meet and have a drink, one of the three wants to start a card game, and he wants to take somebody else's money. The Golden Rule is not part of Hoyle's Rule and so doesn't enter into card games. Good personnel relations demand a bit of the Golden Rule, and anything that steps in between it and the men should be ruthlessly barred.

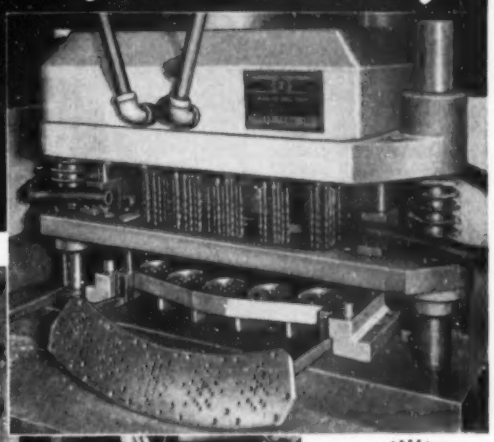
A good movie might be shown, or a piano provided, with somebody to initiate and lead community sing-

"I'll sure be glad when the drafting department finishes those exploded views."

UNITED AIRCRAFT chooses

***Zagar* engineered drilling**

for J-47 Jet Engine Parts



UAP

Zagar evolves best method for drilling 383 holes in header plates and manifold for liquid-to-liquid heat-exchanger. Photographs by courtesy of UNITED AIRCRAFT PRODUCTS, INC., Dayton, Ohio.

The job: to save most time and money in drilling 365 holes .200 diameter and 18 holes 5/16" diameter. Zagar *engineered drilling* licked it.

● You, too, can profit from the often demonstrated ability of Zagar gearless drillheads to drill hundreds of holes at one pass. Zagar's engineered drilling permits record-breaking performance without drill breakage. Used alone or combined into 4-post machines, Zagar gearless drillheads drill any material and any size hole on all centers as close as twice the drill diameter. No application is too difficult for Zagar standard machines 16", 24", 32" and 40", or for special machines to fit your needs exactly. All this, at a new low cost of tooling.

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Fewer drills per 1000 pieces,

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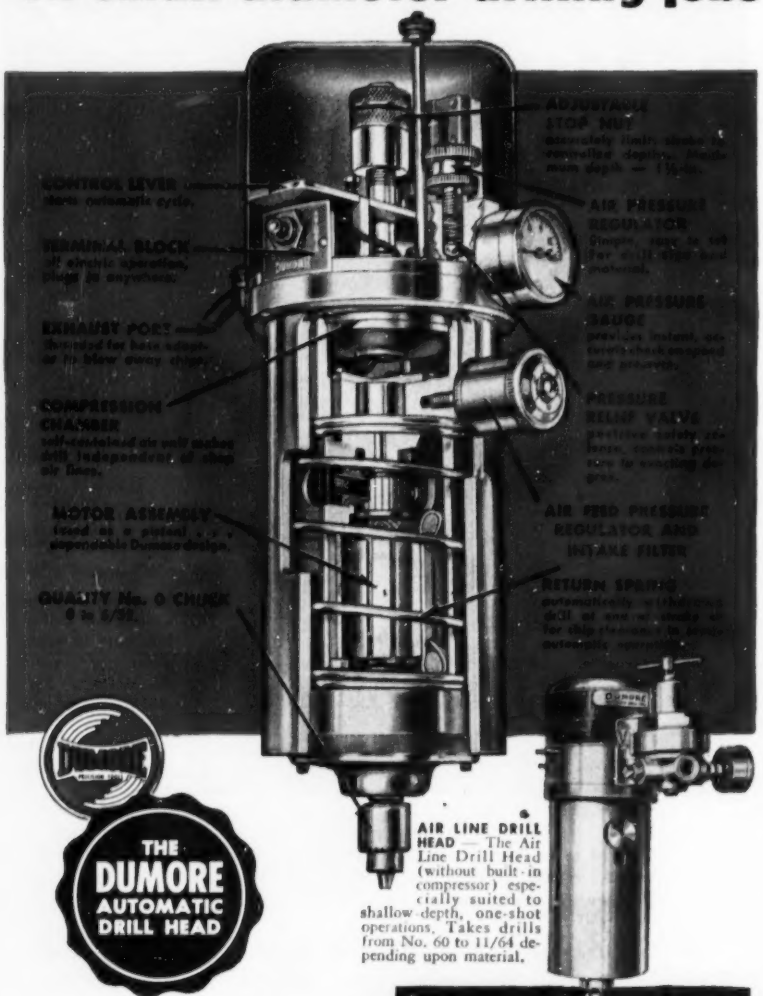

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AIR LINE DRILL HEAD — The Air Line Drill Head (without built-in compressor) especially suited to shallow depth, one-shot operations. Takes drills from No. 60 to 11/64 depending upon material.

WITH the Dumore, size of drill and hardness of material determine speed and pressure at drill point. Pressure is positively regulated by a sensitive relief valve. This assures uniform drill penetration, reduces breakage and prevents overloading. Drills cut smoothly, retain their edge longer.

The Dumore starts and withdraws automatically. Depth and center are accurately maintained to exacting limits on every stroke.

As a result, even with relatively untrained operators, you get more production per day and less drill breakage due to operator error — even on jobs requiring No. 80 drills.

In addition, the Dumore is self-contained, independent of shop air lines. It quickly adapts to any specific production arrangement. Minimizes special tooling and fixtures.

COMPACT IN SIZE — 14½" long, 4½" in dia., weighs 17½ pounds. Completely automatic, built-in controls. Meets a variety of installation applications.

Available attachments include: Bench Stand Repeat Cycle Timer, Mounting Brackets, Foot Control Switch.

Ask your Industrial Distributor or write the Dumore Company for complete details.

DUMORE PRECISION TOOLS

The Dumore Company

1337 Seventeenth Street • Racine, Wisconsin

ing of all the old and new songs. Beer and singing always go hand-in-hand with good fellowship, and I have no interest in any brewery, so I'm boosting for nothing. The combination is good, and in moderation it works fine.

I remember one get-together I attended where beer was provided as well as all sorts of gambling devices —a roulette wheel, faro, dice table, chuck-a-luck, 21, and several others. Each of us was provided with $10,000 worth of stage money, and we had a rousing evening which cost nobody a cent. That sort of a party will click and will be remembered kindly for many years.

But if you want to get men together at a dry dinner on a Saturday night with the big boss present and then insult their intelligence by asking them to talk shop—for *free*—it just ain't kosher. I wouldn't like it myself. If you insist on talking business, for heaven's sake don't be cheap about it; pay them! The directors of any company get and collect a fee for every meeting, even if the purpose of that meeting is to cut themselves an iced melon.

James K Matter
Detroit, Mich

•

JUNGLE LAW

EVERY EMPLOYEE should have an understudy, from the manager down to the sweeper. The future of a company, or even the country, depends upon the stock that is being developed during the present.

Many companies do not plan far enough into the future to replace the wear and tear on personnel. Every corporation has a depreciation account for tax purposes to cover the replacement of obsolete equipment —which they rarely replace—but nothing is put on the side for a decrepit bookkeeper or warped machinist.

In this country of free enterprise there is no law preventing a man from looking into another man's

back yard. If there is something that he likes there, and he has permission or is invited to share in the benefits, he can take it or leave it. It is the duty of an employer to keep his backyard in an attractive condition, not only for the present personnel, but for those who some day will participate in the operation.

Each new employee should be assigned to a specific person for guidance. As the new employee develops a style or talent, he should be re-assigned to display or further develop that art. In this manner, the loss of any employee is not too badly felt, because there is a spare to step into his place.

This is especially necessary if the leader is in a supervisory or advisory capacity. In many cases it is wise to have two men behind each foreman in the event one should leave for greener pastures before the foreman decides to step aside. There is also the possibility that new blood will be necessary during an expansion program, and moving one fellow over to the new division still leaves a reserve for the foreman.

Any foreman who feels that grooming another man for his job is a shaky proposition is not a smart man. In the event that an opening develops above the foreman, he stands a good chance to move up—if he has someone to fill his old job. An assistant also can free the foreman from routine work so that he can do a better over-all job. One of the requirements of a good foreman is the training of men, whether it is in a specific trade, or to take over his job when it becomes necessary.

About this time of the year every foreman should pick out someone to break in to fill in while he takes his vacation.

Frank J Zarnowski
Rutherford, NJ

"How do I get back into the plant cafeteria, Mac?"

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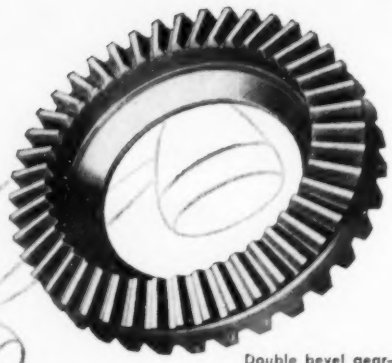

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NEW BOOKS

REPORT ON SURFACE PREPARATION OF STEELS FOR ORGANIC AND OTHER PROTECTIVE COATINGS — *Published by Nat'l Ass'n Corrosion Engineers, 1061 M & M Building, Houston 2, Texas. 13 pages. 8½x11¼ in. Paper bound. Price $1.*

This is the second interim report dealing with methods of preparing steel surfaces for coating and is designated Publication 53-1. It covers recommendations and explains methods for preparing steel surfaces for painting with organic or other coatings. Methods covered include weathering, wire brushing, grinding, flame conditioning, wet and dry nozzle blast cleaning, wheel blasting, chemical and electrolytic pickling, and surface conditioning. Accepted standards are discussed and safety measures indicated.

•

SUCCESS THROUGH WELDING — *Published by Lincoln Electric Co, 22801 St Clair Ave, Cleveland 17, Ohio. 50 pages. 8½x11 in. Paper bound. Price $0.50.*

Regular readers of Lincoln's *Stabilizer* will recognize most of the 25 stories related in this book, as it is a reprint of outstanding "Liberty Bell" items that have appeared in that publication. As the editor, A F Davis, points out, these stories are not related to glorify the welding process, but to point out that the American system of free enterprise continues to offer opportunities to

alert, hard-working men for creating their own businesses.

It is pointed out that the country has over 9 million small businesses with fewer than 25 employees. The story of how 25 of these have succeeded in establishing successful welding companies is retold in these pages, that others may realize that perseverance, ability, hard work, and individual initiative in thought and action can still bring the same rich rewards they brought to the rugged individualists who, earlier in our history, founded the country.

•

TOOL ENGINEERS DATA BOOK. *By Gerhard J Gruen. Published by Book Division, Reinhold Publishing Corp, 330 West 42nd St, New York 36, N Y. 219 pages. Price, $5.50.*

The author has developed this data book from several assumptions: (1) handbooks are cumbersome, cover a wide range of subjects, and present few tables, (2) the practicing engineer does not have the time to "search through heavy volumes" and can obtain better results by using a book of tables and minimum explanations. It is conceivable that his ideas are correct, but the content of this book does not live up to the title. For the bulk of the material comprises only a very small portion of the information that a tool engineer would naturally require for reference purposes. Actually, the author's compilation of data covers weights, chemical properties, mechanical properties, heat treatment, rapid identification, and working properties of metals and alloys, plus plastics. Various formulas, conversion tables, and mathematical tables have been added. A more appropriate title would have been "Concise Data on the Properties of Materials," for the book has a broader appeal than to tool engineers alone. On that basis, the book has merit in being quite up to date in respect to material specifications.

•

SPINDLE NOSES AND ARBORS FOR MILLING MACHINES — *American Standard ASA B5.18-1953. Published by the American Society of Mechanical Engineers. 29 West 39th St, New York 18, NY. Seven pages, 8½ × 11 in. Price, $1.*

This standard has been in existence for ten years. The revision entails bringing references to screw threads into line with the American Standard Unified and American Screw Threads (AS A B1.1-1949).

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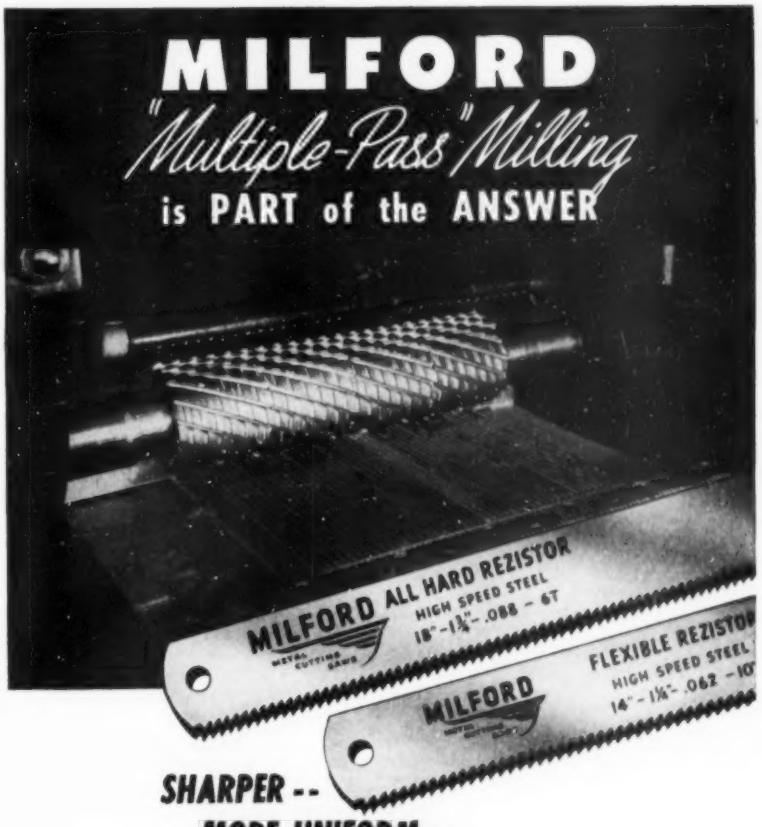

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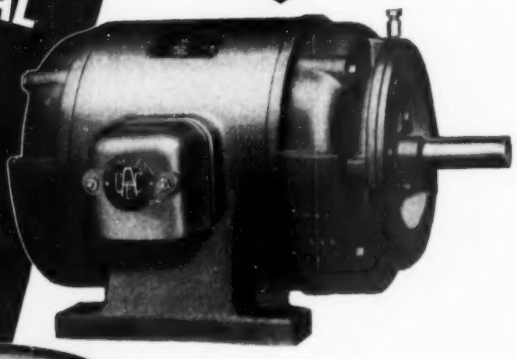

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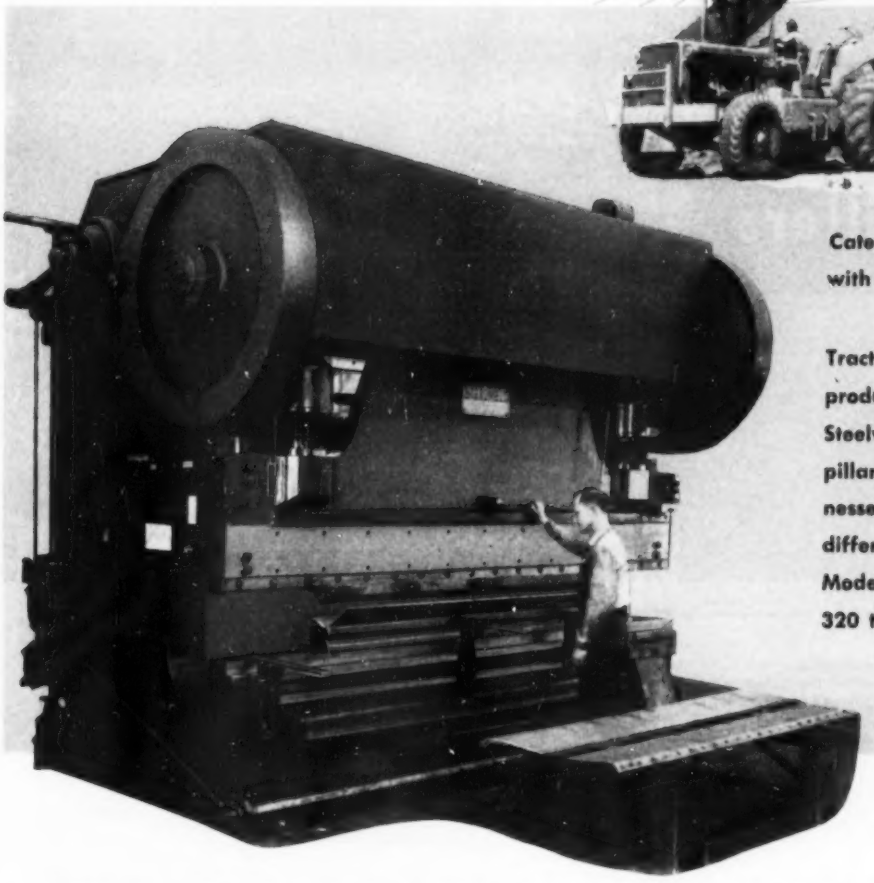

Caterpillar DW20 Tractor with W20 Wagon.

Tractor equipment parts produced on this and other Steelweld Presses at Caterpillar are of various thicknesses and require many different bends. This is a Model K5-10 Press rated at 320 tons.

THE ease and speed with which dies can be changed on Steelweld Presses and necessary adjustments made have proven a big asset in obtaining high production of a great variety of steel parts for scrapers, rippers, bulldozer blades and wagons at the Joliet Plant of Caterpillar Tractor Co.

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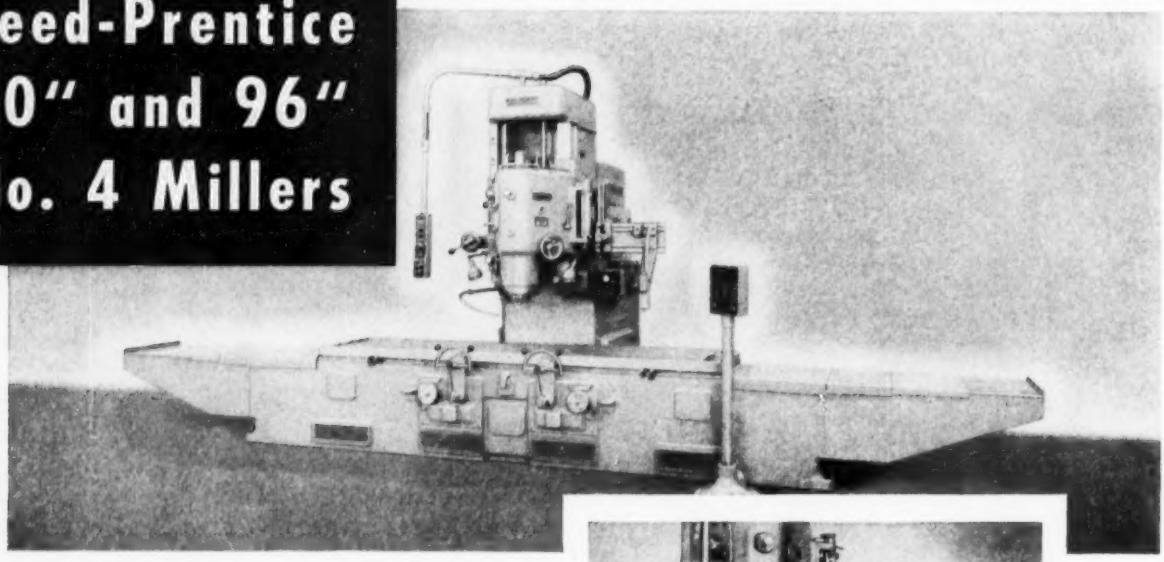
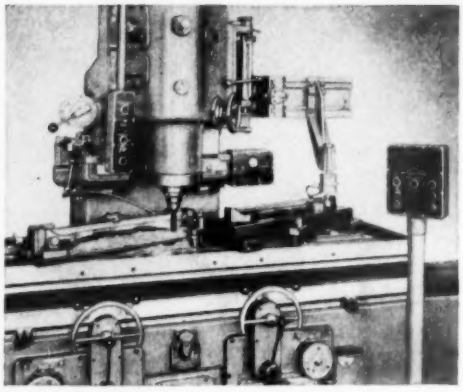


96" No. 4 Vertical Miller with two-dimensional Contouring Unit



Two-dimensional electronic contour follower system on No. 4 Miller duplicating aircraft part for Kaiser Manufacturing Company of Richmond, California.

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Travel of cross slide		24"	24"
Table working surface		24 x 96"	24 x 132"
Feed range		½ to 25" per minute	
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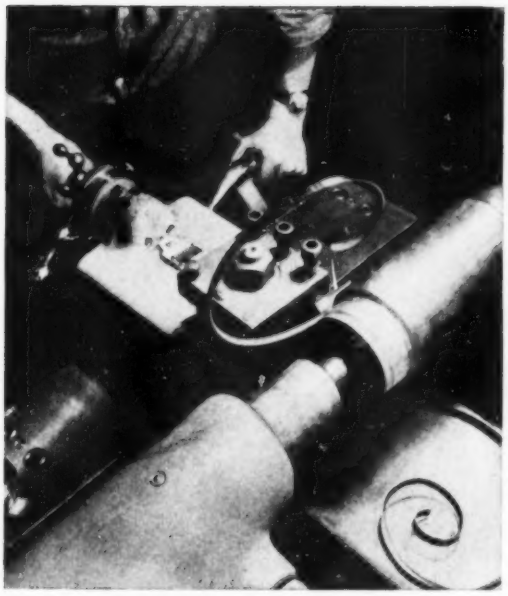
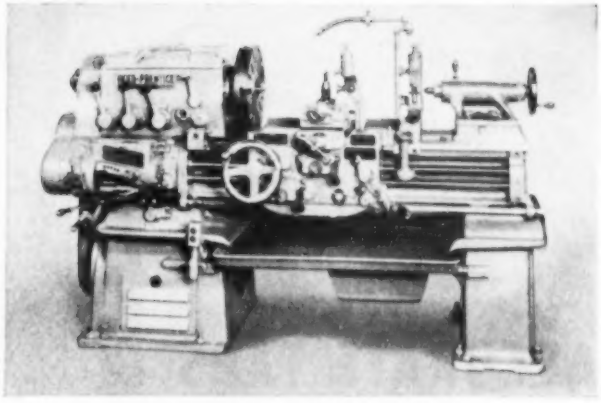
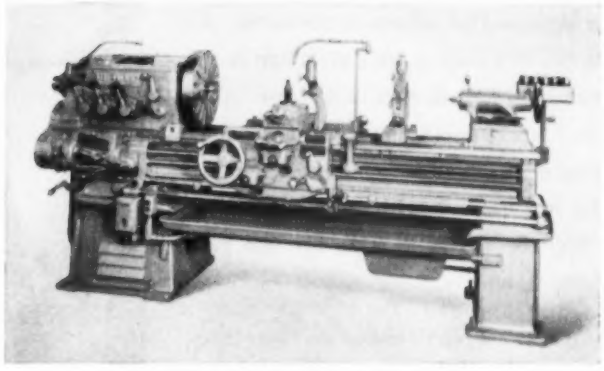




Reed-Prentice 14" Engine Lathe



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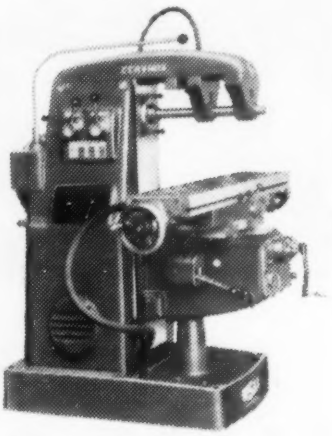

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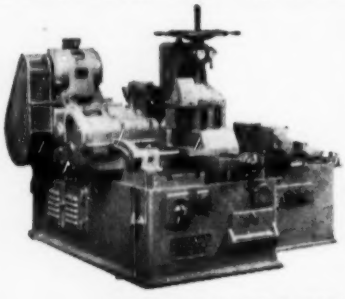

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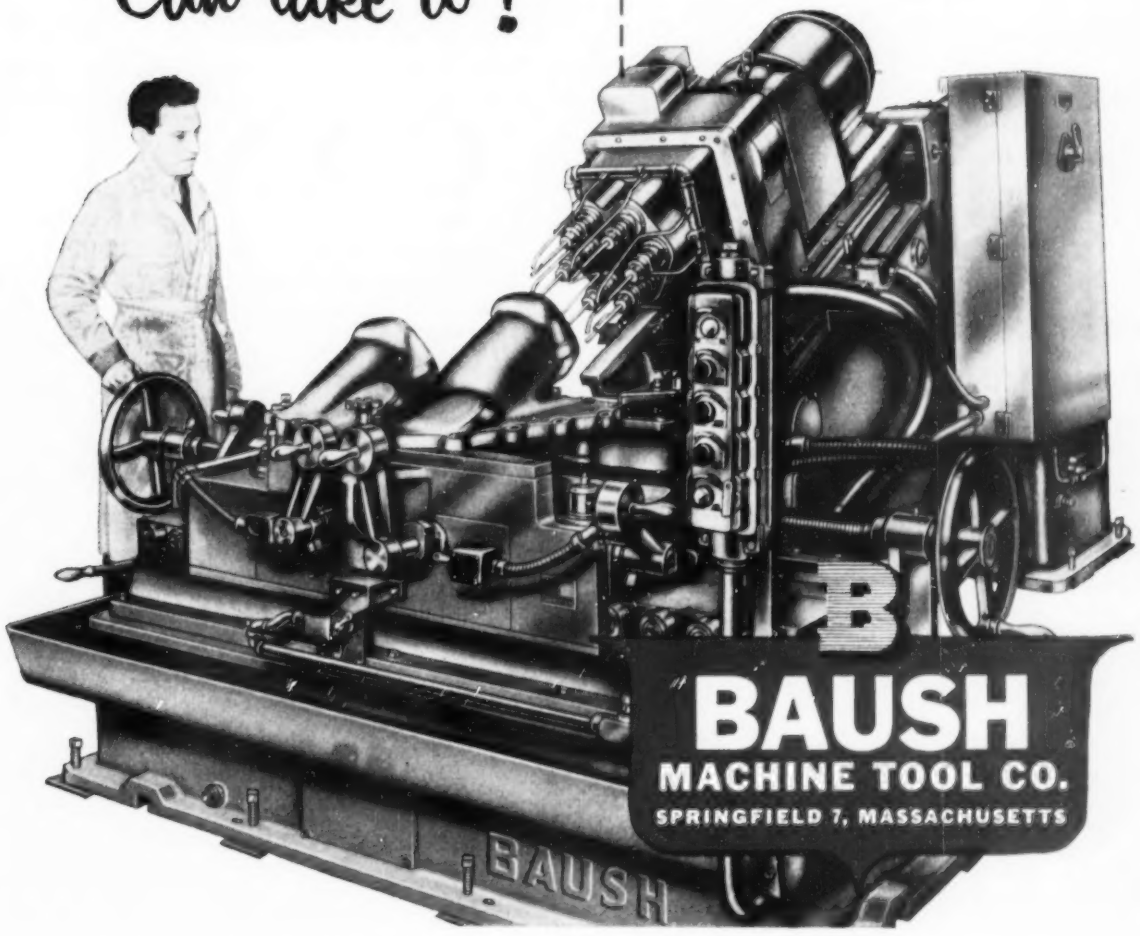
Parts are loaded into fixture proper, locating from two movable pins that enter reamed construction holes in the flange and are clamped down with planer type clamps. The fixture slide is located by hand-operated shot bolt that is interlocked electrically. Slide operates by screw and hand wheel.



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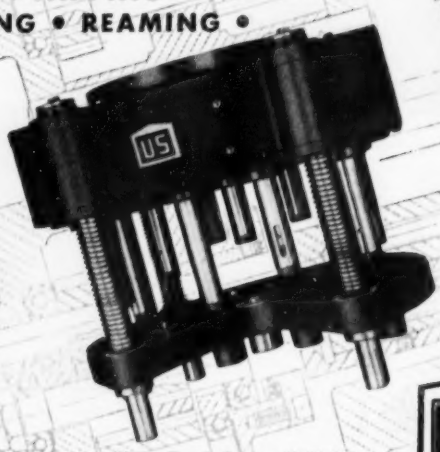
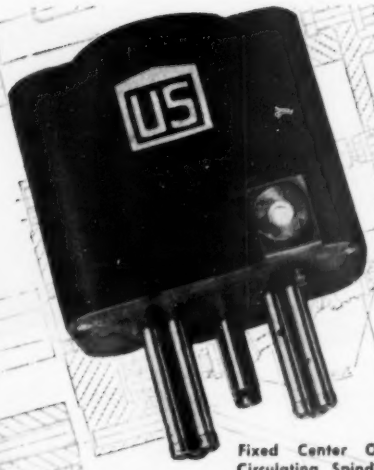


Close Fixed Center Multiple Head with Suspended Bushing Plate.



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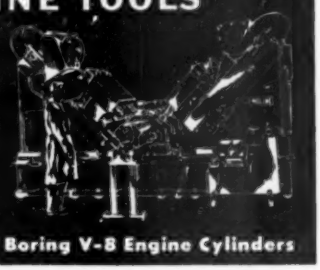

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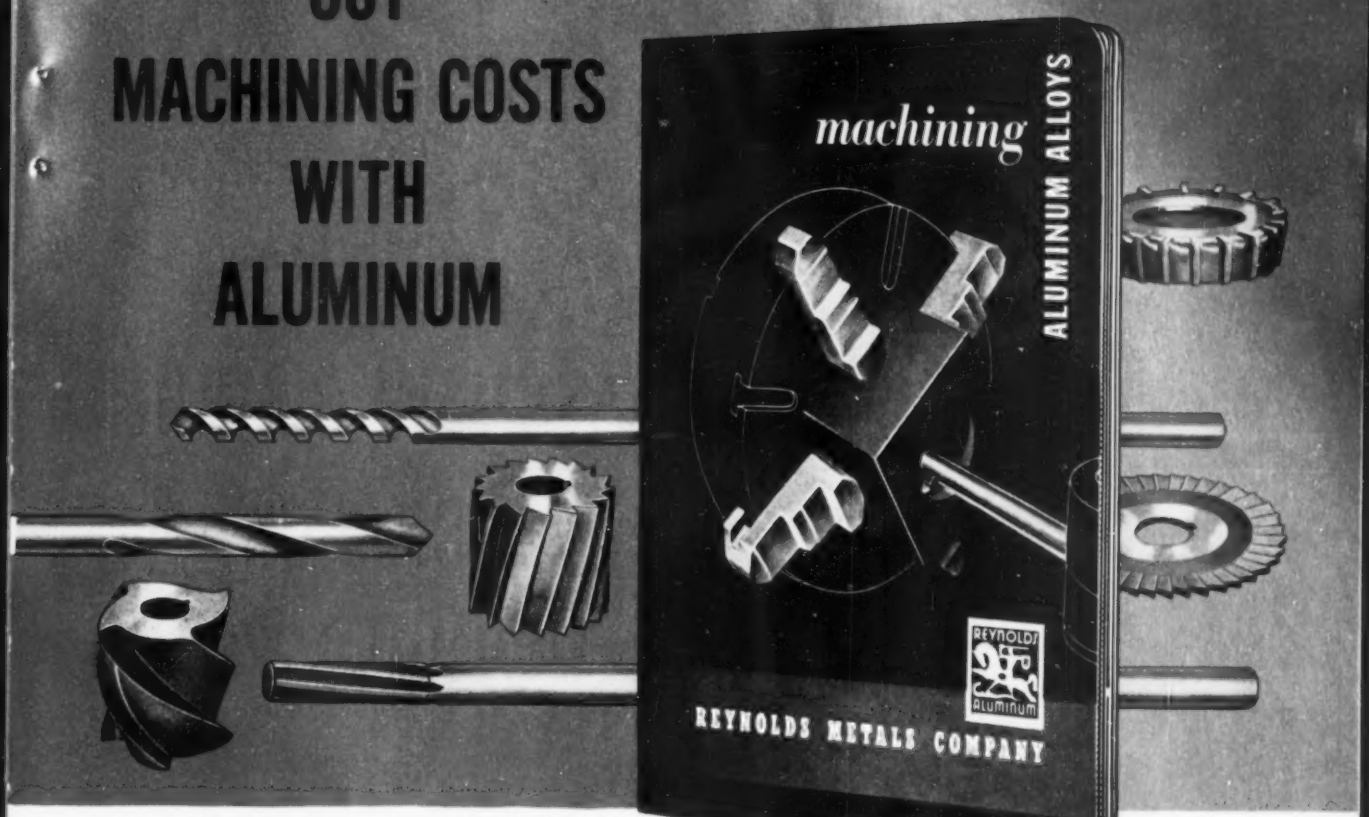

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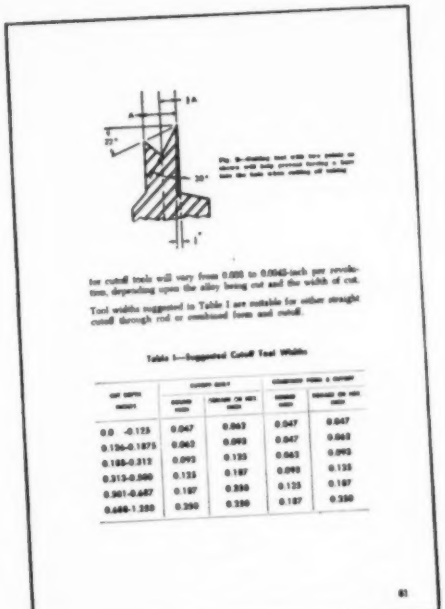

for cutoff tools will vary from 0.005 to 0.0045-inch per revolution, depending upon the alloy being cut and the width of cut.

Tool widths suggested in Table I are suitable for either straight cutoff through rod or combined form and cutoff.

Table I—Suggested Cutoff Tool Widths

0.0 -0.125	0.047	0.062	0.047	0.047
0.126-0.1875	0.062	0.093	0.047	0.062
0.188-0.313	0.093	0.125	0.062	0.093
0.313-0.500	0.125	0.187	0.093	0.125
0.501-0.687	0.187	0.250	0.125	0.187
0.688-1.250	0.250	0.250	0.187	0.250

61

THIS HANDBOOK TELLS YOU HOW

The handiest, most helpful handbook you can get on the machining of aluminum alloys is yours for the asking. This book evaluates the various aluminum alloys and recommends machining methods and tools that give maximum production economies. There is a special section on automatic screw machining. Every designer, production engineer, plant manager and machine shop superintendent needs this 124 page "Machining Aluminum Alloys" on his desk. Write on business letterhead for your FREE copy and a complete index of Reynolds technical literature to Reynolds Metals Company, 2523 South Third Street, Louisville 1, Kentucky.

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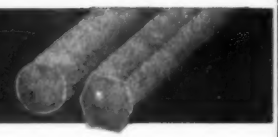

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17S-T4—Excellent finishes. Fine for general purpose machining. Good corrosion resistance and strength.

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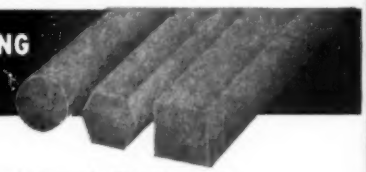

24S-T4—For simple machine work. Chips long and curled. Stronger than preceding alloys. Smooth finishes.

61S-T6—Good corrosion resistance, weldability, strength. Lower machinability. Best formability and suited to electro-chemical finishes.

2S and 52S—Higher purity aluminum alloys available for special applications. Have good formability.

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FYI—these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted. When you have filled out a card, detach, stamp, and mail. We'll do the rest.

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2 LATHES—*South Bend Lathe Works, South Bend, Ind.* 12-page catalog 5304 covers line of 9-in. floor and bench models; 42 attachments and accessories for adapting to wide range of operations illustrated.

3 PROFILOMETER — *Micrometrical Manufacturing Co, Ann Arbor, Mich.* 8-page illustrated bulletin covers practical features and applications. Describes 7 uses for production and quality control.

4 CHAMFERING MACHINE—*Modern Industrial Engineering Co, Detroit, Mich.* Bulletin 2029 describes Model 2029 Burr-Master for automatic deburring and chamfering at 20 teeth per second. Details on cycle, performance and construction illustrated.

5 POWER PRESSES—*Clearing Machine Corp, Hamilton, Ohio.* 4-page bulletin contains detailed data on double crank straight side presses. Specification table included.

6 PRECISION LATHES—*Louis Levin & Son, Los Angeles, Calif.* 32-page catalog illustrates and provides specifications on extensive line. Accessories, from arbors to utility sets, indexed and illustrated.

7 GRINDING—*Landis Tool Co, Waynesboro, Pa.* 84-page leatherette-covered book has 17 chapters on basic grinding facts applicable to cylindrical machines. Information and instructions profusely illustrated.

TOOLS AND ACCESSORIES

8 CARBIDE TOOLS—*The Nelco Tool Co, Manchester, Conn.* 48-page catalog C-10 offers comprehensive information on 800 tools. Illustrated data provides applications, specifications, and price lists.

9 VISES AND ACCESSORIES—*Chicago Tool & Engineering Co, 8388 S Chicago Ave, Chicago, Ill.* 8-page illustrated catalog offers data on complete Palmgren line of vises, rotary tables, milling attachments, adjustable angle plates, and other accessories.

10 MOLYKOTE LUBRICANTS — *The Alpha Corp, Greenwich, Conn.* 8-page bulletin 100 contains technical information on various grades and compositions, including two newest types, and standard line. Prices, ordering instructions, and packaging data included.

11 MARKING EQUIPMENT—*Newark Stamp & Die Works, Newark, NJ.* 20-page catalog offers indexed information on extensive line of devices and equipment. Service includes analysis of individual requirements, and data to reduce costs, speed production.

12 CUTTING TOOLS — *Whitman & Barnes, Plymouth, Mich.* 176-page catalog 105 illustrates and describes extensive line. Alphabetical and numerical index provide complete size and type listings.

13 WAX LUBRICANTS—*S C Johnson & Son, Inc, Racine, Wis.* 34-page illustrated brochure on properties, types, and applications. Additional 20-page booklet on case histories available.

14 HI-SHEAR TOOLS—*Rivet Tool Co, Los Angeles, Calif.* 20-page illustrated catalog contains detailed information on product, installation data, variety of sets and tools available.

15 SAW BLADES—*Capewell Manufacturing Co, Hartford, Conn.* Three illustrated information booklets available on selection and use of hand hack and power hack saws, and hand saw blades. Data included on operation and maintenance of bandsaws. Includes charts and diagrams.

16 WORK DRIVERS — *The Shinner Chuck Co, New Britain, Conn.* 8-page illustrated catalog provides complete information and specifications on GF line. Functioning, procedures, and applications covered.

HEAT-TREATING AND WELDING

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mation on irons and tips. Diagrams and tables additionally describe construction, application, ratings and prices. Chart included describing flux best suited to base material or applied finish.

18 AMERICAN WELDING SOCIETY —*29 West 39th St, New York, NY.* 16-page brochure explains scope and objectives. List of available publications, codes, standards, and specifications included.

19 HEAT-TREATING FURNACES—*Despatch Oven Co, Minneapolis, Minn.* 12-page illustrated bulletin on recirculating units. Variety of applications pictured, performance records included, and detailed specifications for pot type, batch and conveyor models.

20 ALLOYS AND FLUXES—*All-State Welding Alloys Co, White Plains, NY.* Folder covers application of 11 alloys, including silver solder, and fluxes, and galvanizing powder for gas welding, brazing, soldering, and tinning all commercial metals. Technical instructions and applications covered.

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21 MATERIALS HANDLING EQUIPMENT—*Allied Mfg & Sales Co, Chicago 6, Ill.* 36-page catalog describing various lift trucks, elevators, dumpers, cranes, derricks and related equipment. Catalog is letter-file size, with separate sections for each category.

22 FLOOR RESURFACING — *United Laboratories, Inc, Cleveland, Ohio.* 4-page folder describes uses and methods of application of low-cost Mastic flooring. Data on performance also included.

23 SMALL PARTS STORAGE—*Union Metal Mfg Co, Canton, Ohio.* 6-page folder MH-810 gives information on Vu-O-Matic rotary stand, showing capacities, dimensions and suggestions for use in storing small articles.

24 ZINC DUST—*Federated Metals Div, American Smelting and Refining Co, NY, NY.* 4-page bulletin No. 141 describing various applications of zinc dust, as rust preventive, paint base, and various other industrial chemical uses.

25 CLAMPS—*Smith Devices, Inc, Philadelphia, Pa.* Two 1-page bulletins, 300 and 400, describing heavy-duty clamps and grips for attachment to cables and slings.

26 PORTABLE CONVEYOR — *Trowbridge Conveyor Co, Clifton, NJ.* 4-page catalog No. 252 contains information on portable conveyor for weights to 500 lb. Dimensions and specifications of various models are also given.

27 SIT-DOWN LIFT TRUCK—*Mercury Mfg Co, Chicago 9, Ill.* 6-page bulletin 430 describes Yak 430 truck, giving design features, dimensions, and specifications.

PARTS AND MATERIALS

28 WEIGHT INDICATOR—*W C Dillon & Co, Van Nuys, Calif.* 6-page folder covers details on unit. Specifications, engineering details, and price data provided. Tear-sheet on dyna-switch for automatically stopping hoist or crane on an overload, and automatic overload signal also available.

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32 SQUIRREL CAGE MOTORS—*Newman Industries, Inc, New York NY.* 20-page catalog contains specifications, illustrations, and dimensions of totally enclosed, fan-cooled units up to 30 hp, and drip-proof, wound rotor motors up to 125 hp.

33 PROTECTIVE RELAYING — *General Electric Co, Schenectady, NY.* 72-page illustrated booklet GET-1768A covers principles, data on types of relays used for protecting generators, transformers, transmission lines. Procedures outlined for determining applications.

34 SPECIALTY TRANSFORMERS—*Westinghouse Electric Corp, Pittsburgh, Pa.* 18-page illustrated booklet B-5806 gives detailed infomation on standard line for general purpose. Part II covers units built to fit specific requirements. Section included on testing techniques and core developments.

35 COATINGS—*Minnesota Mining & Mfg Co, Adhesives & Coatings Div, Detroit, Mich.* 12-page brochure Z-AMM illustrates and describes applications of adhesives, sealers, and coatings as used by automotive manufacturing industry. Strippable coatings particularly applicable to aircraft also covered.

36 PRESSURE SEAL — *Sealol Corp, Providence, RI.* 8-page bulletin 7 offers detailed data on Sealol unit. Principle, identification system, description of types covered. Dimension table, installation and design information included.

MISCELLANEOUS

37 MACHINE TOOL REBUILDING—*J L Lucas & Son, Inc, Fairfield, Conn.* Illustrated brochure covers facilities and procedures.

38 SAFETY SERVICE GUIDE — *National Safety Council, Chicago, Ill.* 52-page Service Guide 2.1 is a complete catalog of accident prevention aids available for plant safety programs. Posters, films, and booklets available are listed.

39 SMALL LOT STAMPINGS—*Duplicon Co, Inc, Westboro, Mass.* Booklet illustrates facilities for inexpensive stampings in steel, brass, aluminum.

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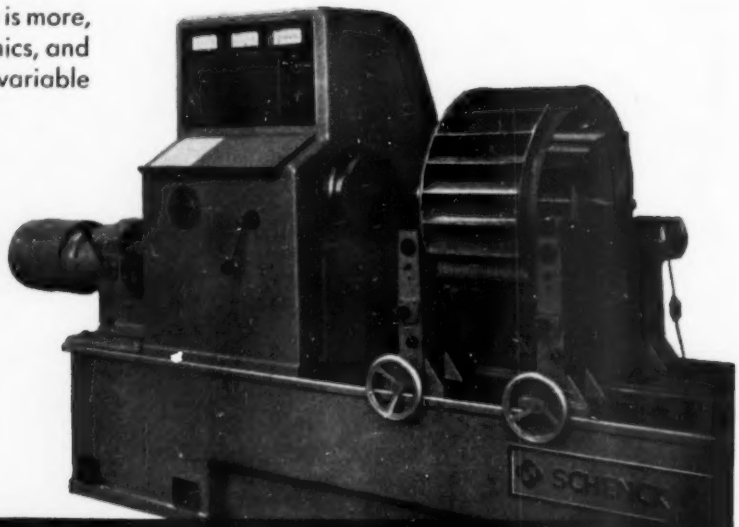

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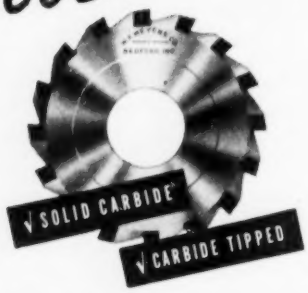

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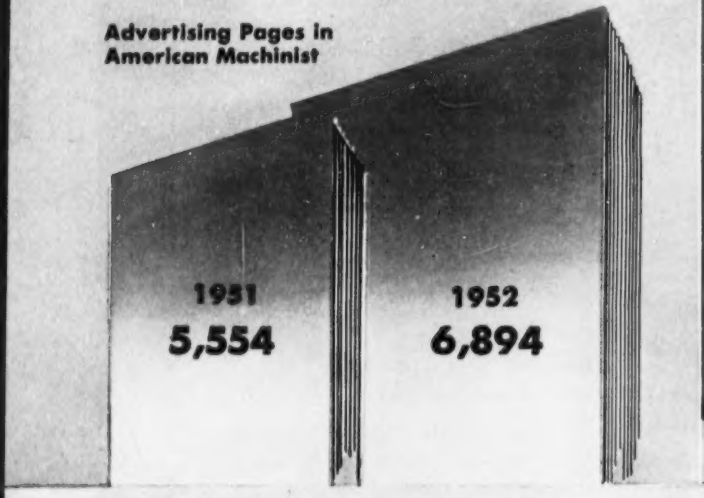

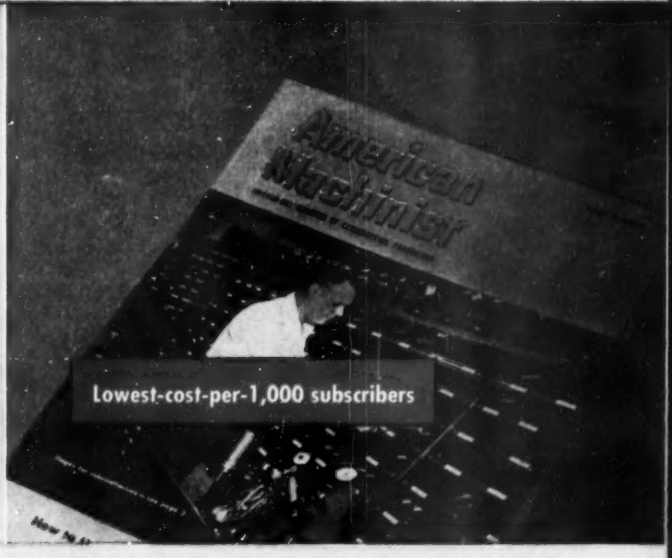

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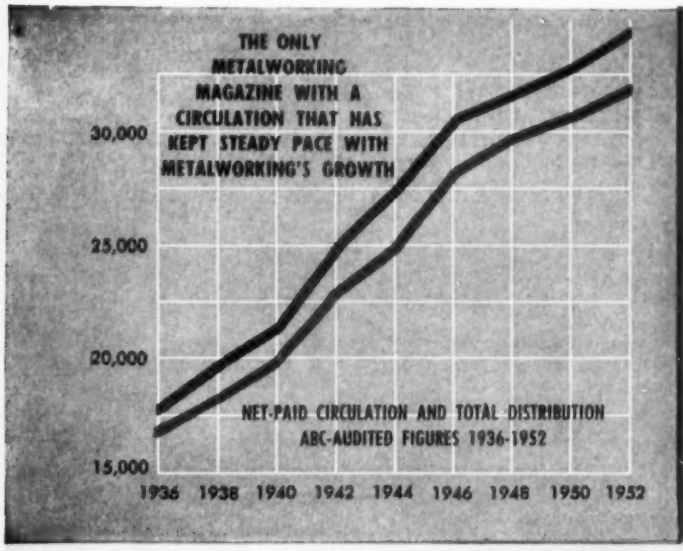
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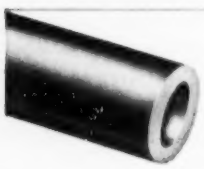

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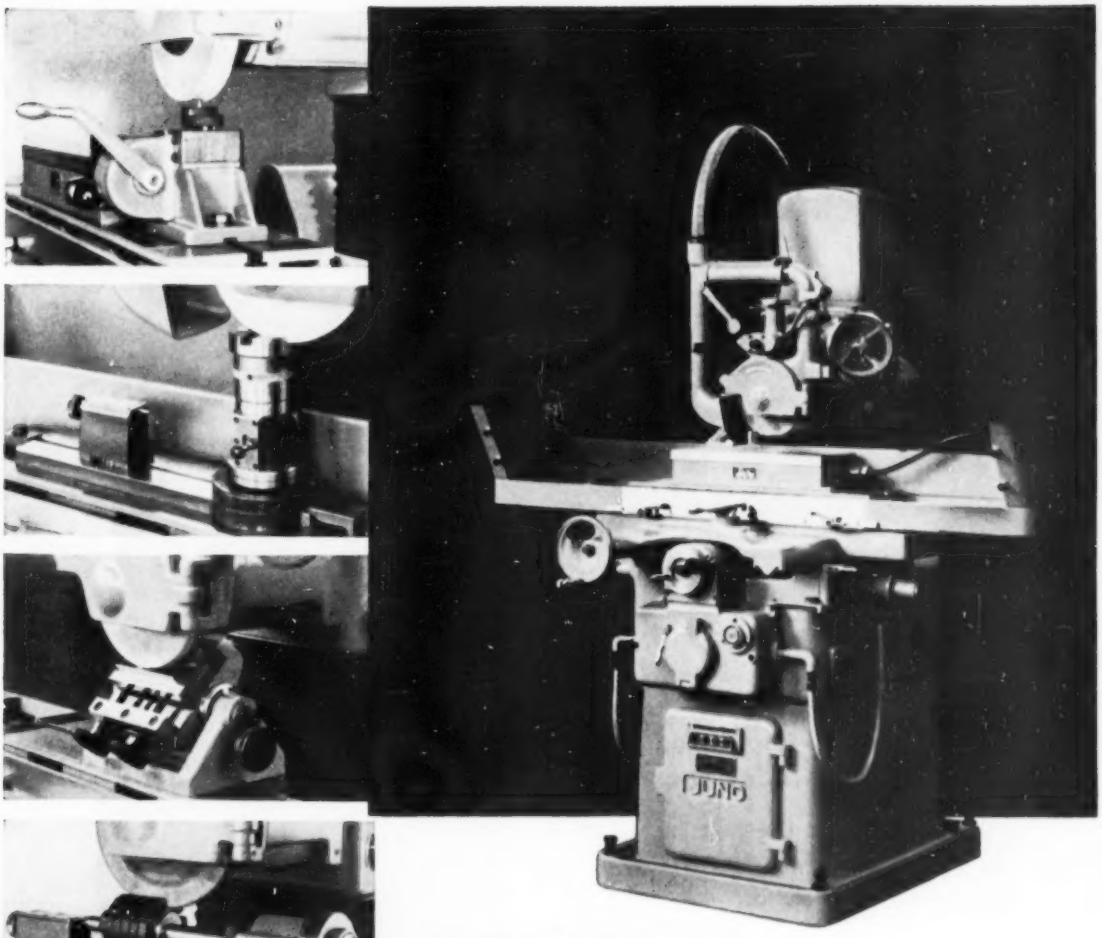

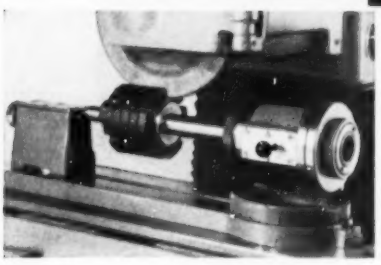

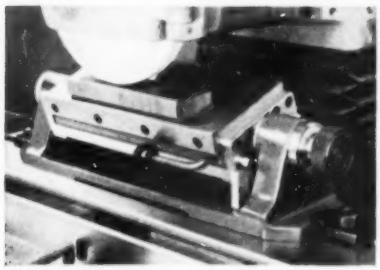

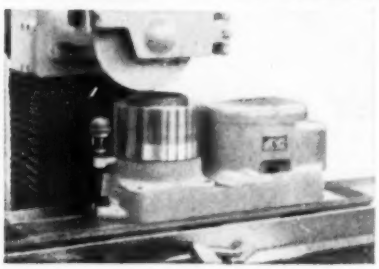

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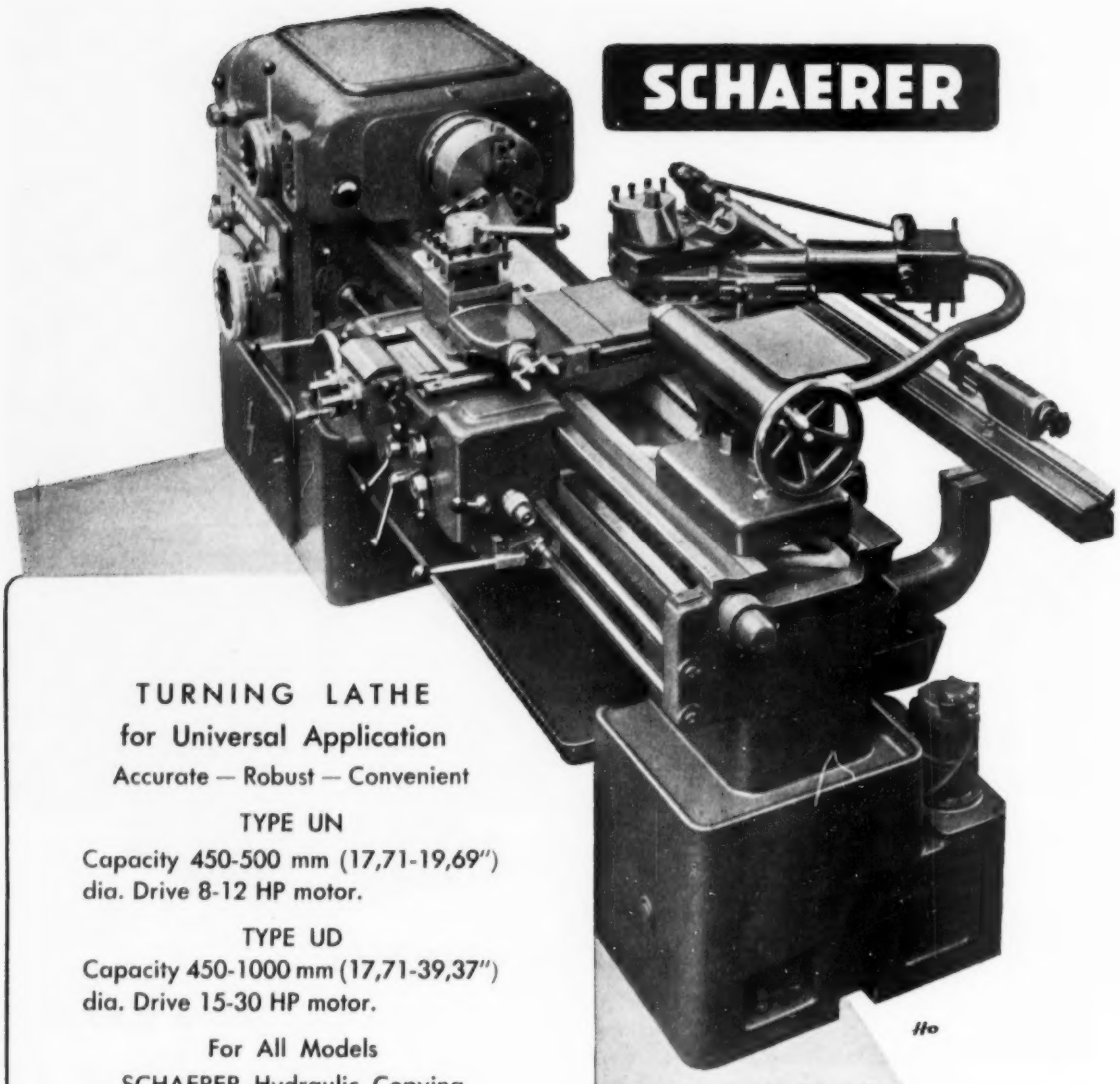

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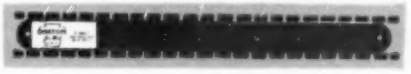

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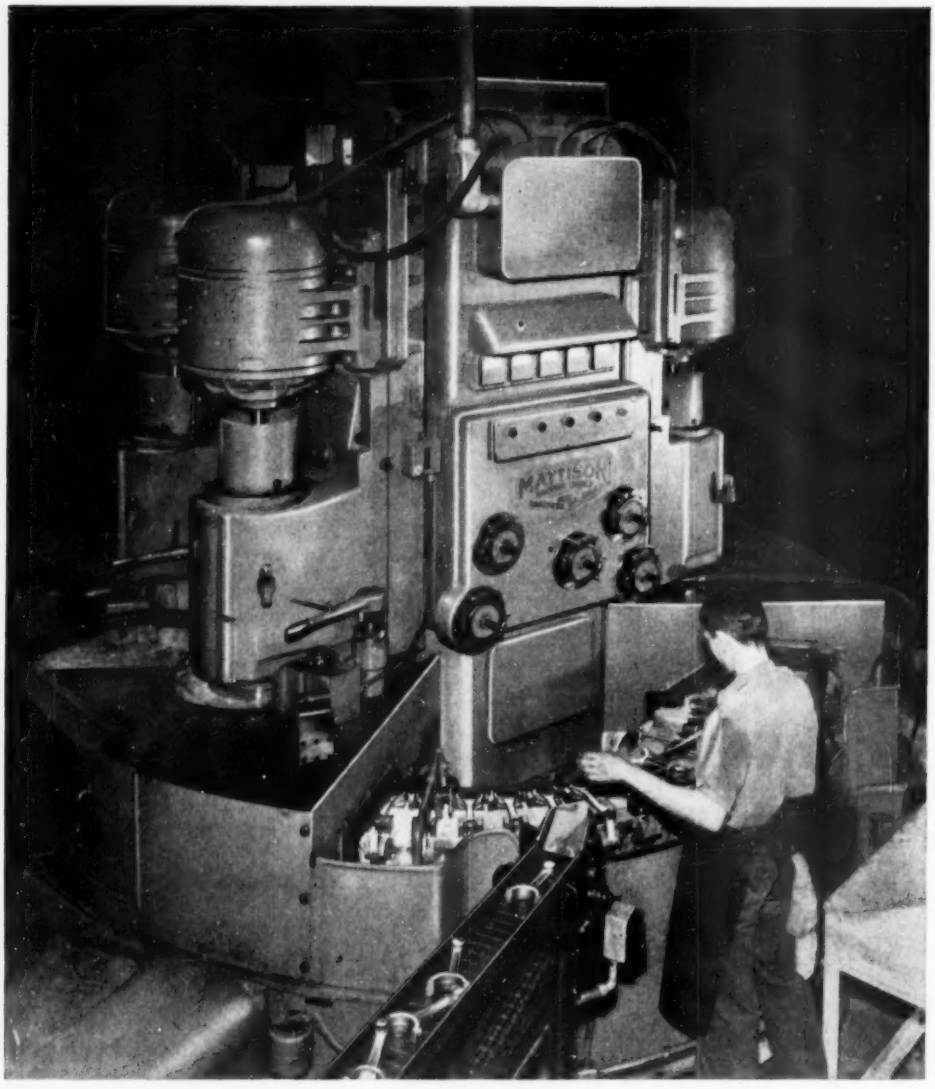

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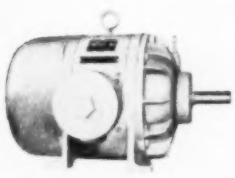
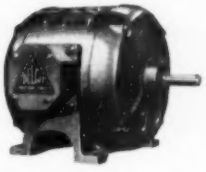
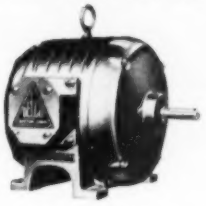


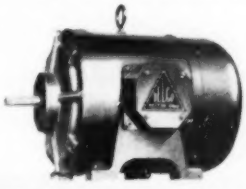
Explosion-proof motor



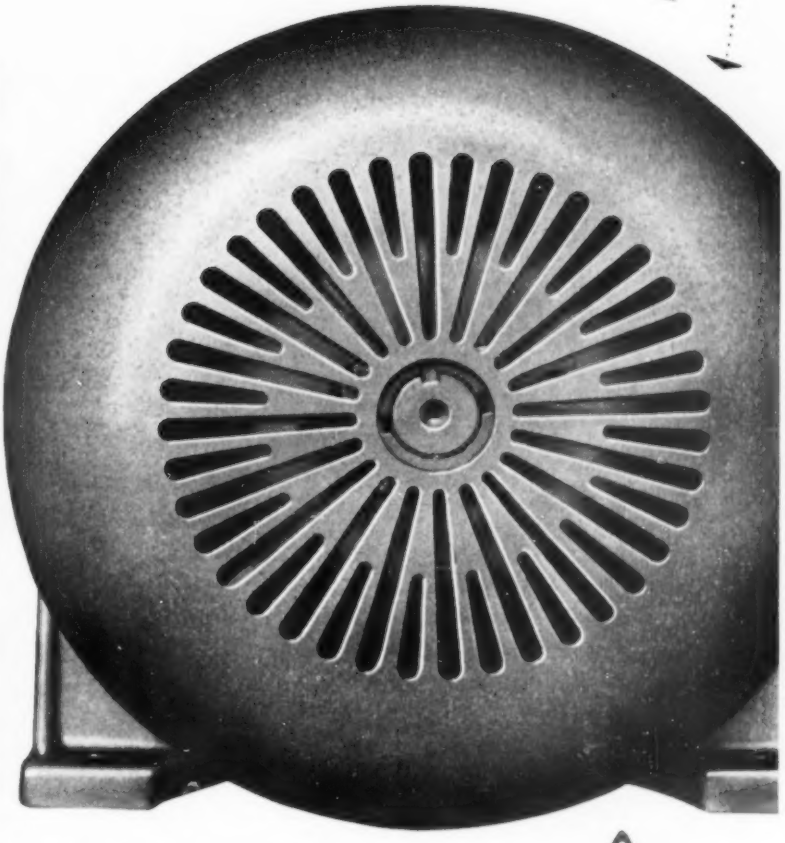
Open ball-bearing motor



Totally enclosed ball-bearing motor



Totally enclosed fan-cooled motor



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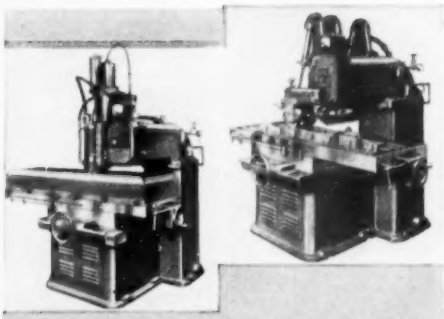

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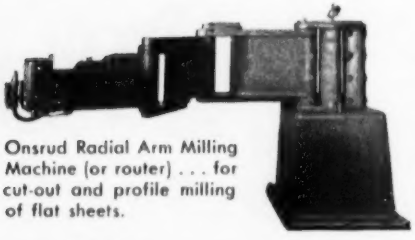

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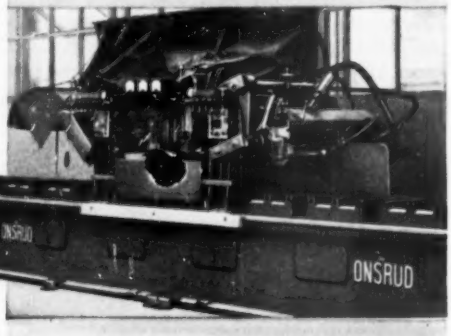

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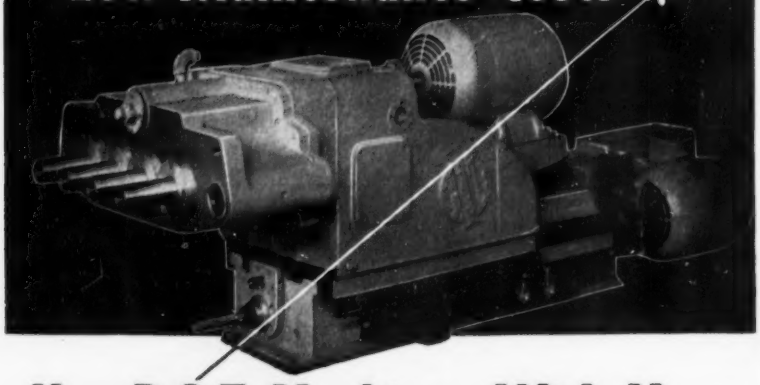

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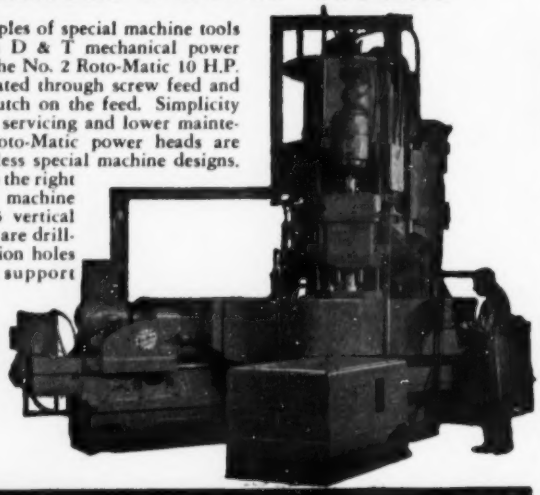

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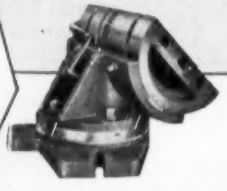

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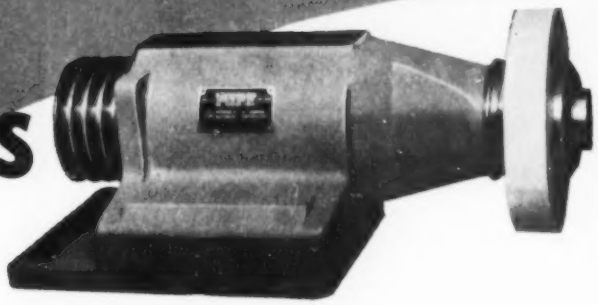
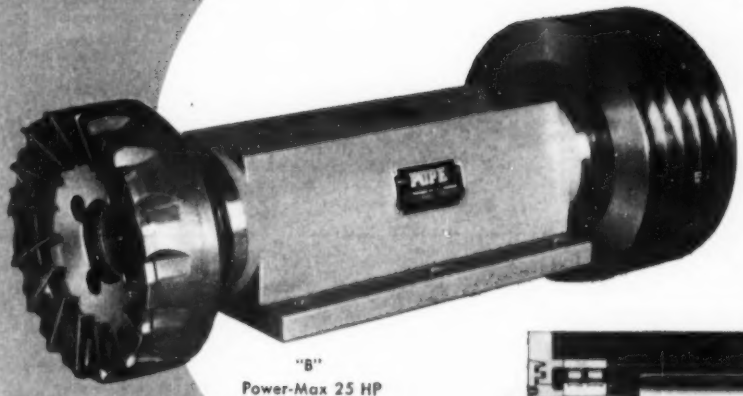


"A"



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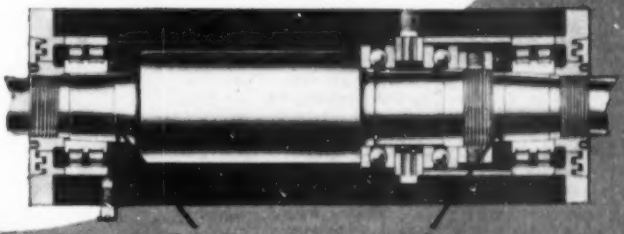

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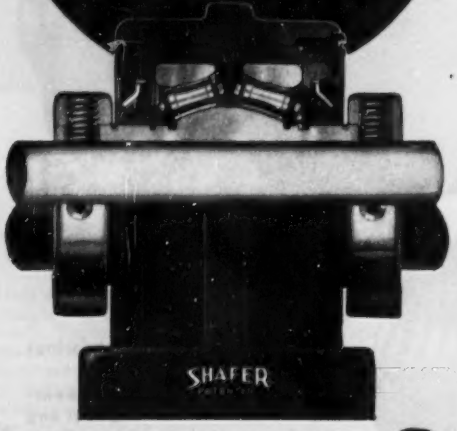

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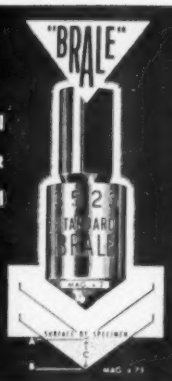

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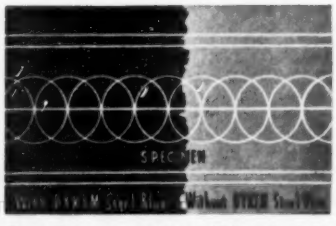

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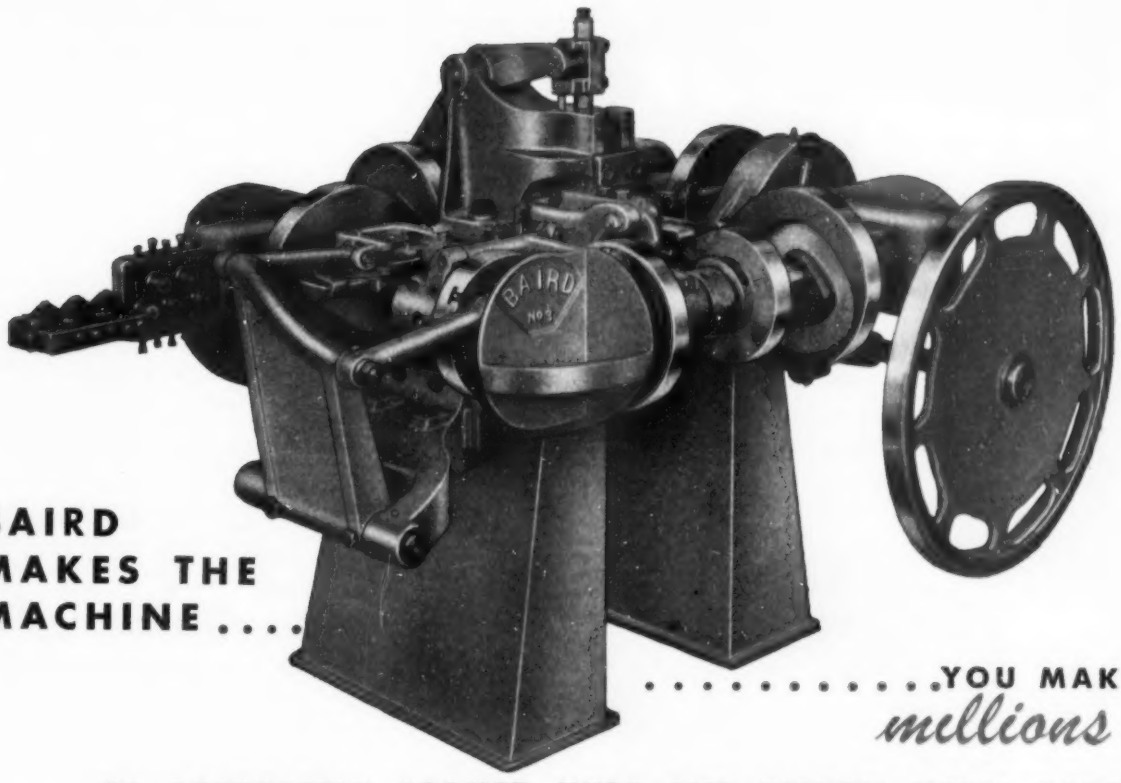

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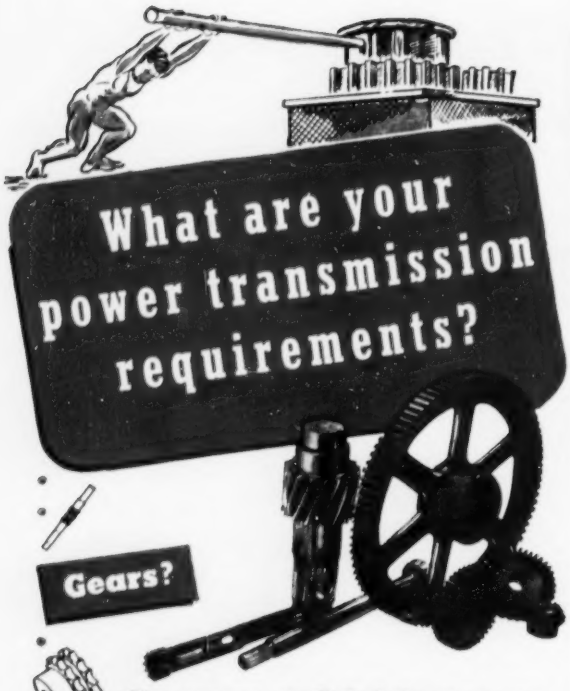
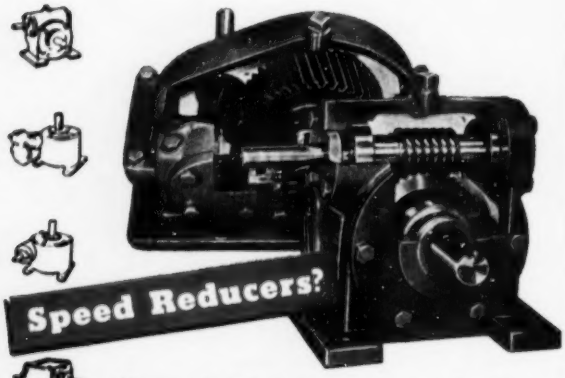


Chances are you'll find the gear you want available from Grant's mammoth stock. If not, complete facilities are available to cut all types. Deliveries made on your schedule.



Worm, double worm, compound worm and spur, helical, mitre gear — Grant makes them all . . . reductions up to 3660-1 . . . most types available from stock.

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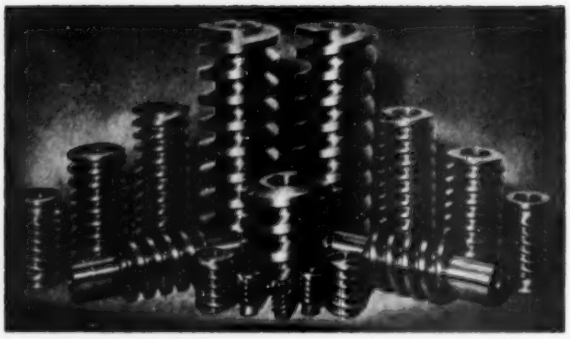

ADAMS custom made gears

While your product is still on the boards, plan on using Adams precision-made gears. Built by craftsmen . . . exactly as specified.

the ADAMS line . . .

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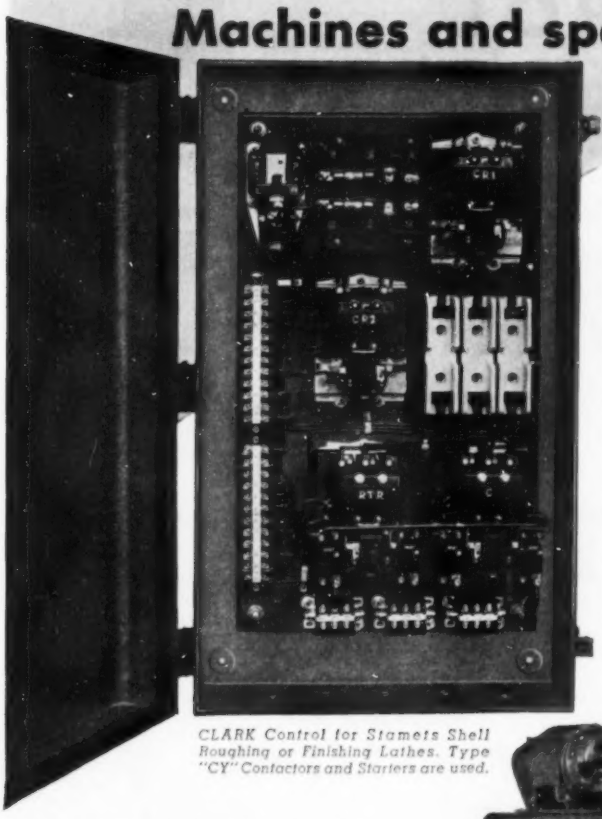
GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS

CLARK TYPE "CY" STARTERS

efficiently control STAMETS Heavy-Duty Machines and speed shell production!



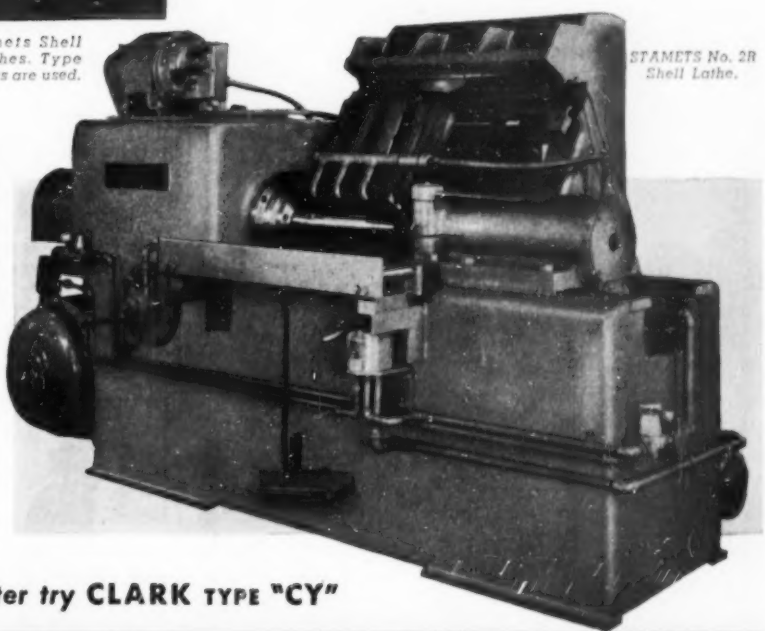
CLARK Control for Stamets Shell Roughing or Finishing Lathes. Type "CY" Contactors and Starters are used.

In several plants, Wm. K. Stamets No. 2R Shell Cut-Off machines, and Shell Lathes are producing 105 MM and 155 MM shells at a high rate.

Three types of machines, all with CLARK CONTROL, are used in each production line. A cut-off machine faces the solid end of the forging and cuts off the open end to the required length. The Roughing Lathe roughs out the shell, and the Finishing Lathe gives the shell its final contour and finish.

Depending on the size of the shells, and the optimum cutting speeds, the cut-off machines turn out 34 to 60 shells per hour.

While not completely automatic, the entire process is greatly simplified, loading and unloading, cutting off and turning of the shells is accomplished with a Foot Pedal, a "start" push button, and motion is stopped by a Limit Switch.



STAMETS No. 2R Shell Lathe.

Desirable cushioned stopping of the roughing spindle motor is accomplished by using current limiting resistance in the reverse plugging circuit. Smooth fast stopping, with no shock to the machine and no interference with production rate results.

Clark Type "CY" Starters and Relays controlling the Finishing Spindles provide completely satisfactory service.

Machine tool control problems are easily solved when CLARK TYPE "CY" equipment is used.

You'd better try **CLARK TYPE "CY"**

THE CLARK CONTROLLER CO.

ENGINEERED ELECTRICAL CONTROL • 1146 EAST 152ND STREET, CLEVELAND 10, OHIO

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with Clifton Hydraulic's *EXCLUSIVE*

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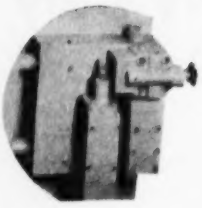

Clifton Hydraulic incorporates a new and important feature in its line of better-built presses. UNITROL reduces maintenance problems and cuts costs by cutting out unsightly piping and valves. Repair or replace valves almost instantly—without costly tearing down valve assembly. Write for full information.

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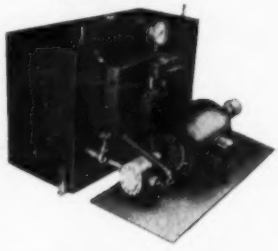

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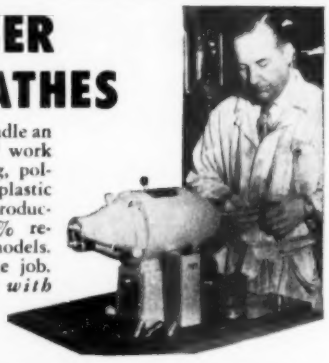
YOUNGSTOWN 7, OHIO
TALIDE

SCHAUER SPEED LATHES



These versatile machines handle an almost *unlimited* variety of work —deburring, filing, lapping, polishing, etc.—on metal and plastic parts. Thousands in use. Production increases up to 158% reported! Many sizes and models. Holding devices to suit the job. *Speed your production with Schauer Speed Lathes.*

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RIVETERS — PIONEERS in their line—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

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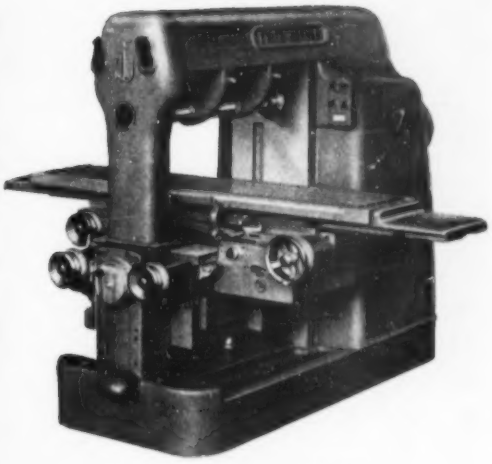
WERNER MILLERS



#5 PLAIN MILLER

No. 5 Vertical & Plain Millers

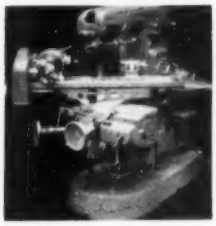
FEATURING:

- Preselector for feeds and speeds
- Rise and fall table
- Rapid traverses in all directions
- Automatic cycle; or manual control
- Built in backlash eliminator

Principal Dimensions

Table: 90½" x 19½"
Spindle speeds: 16 to 1800 rpm
Rapid traverse up to 200" per min.
Table feeds: 3/16" to 80" per min.
Horsepower: 40, or 50 optional
Weight: 24,000 lbs.

#2 UNIVERSAL



No. 2 Vertical, Universal, Plain

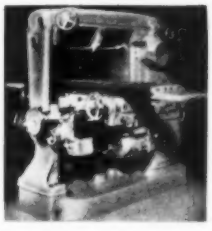
Table sizes: 43"x12"
Eighteen Spindle Speeds
Sixteen Table Feeds
7.5 Horsepower Weight: 4,800 lbs.

#3 VERTICAL

No. 3 Vertical, Universal, Plain

Table sizes: 63"x14¼"
Eighteen Spindle Speeds
Eighteen Table Feeds
11.5 Horsepower
Weight: 8,800 lbs.

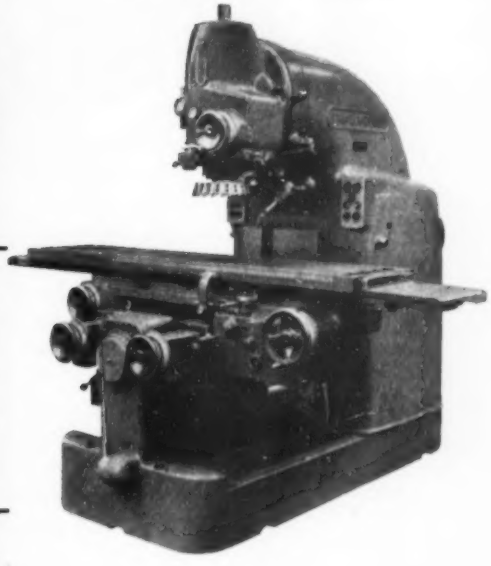
#4 PLAIN



No. 4 Vertical, Universal, Plain

Table Sizes: 71" x 16"
Eighteen Spindle Speeds
Eighteen Table Feeds
19 Horsepower
Weight: 11,250 lbs.

#5 VERTICAL MILLER



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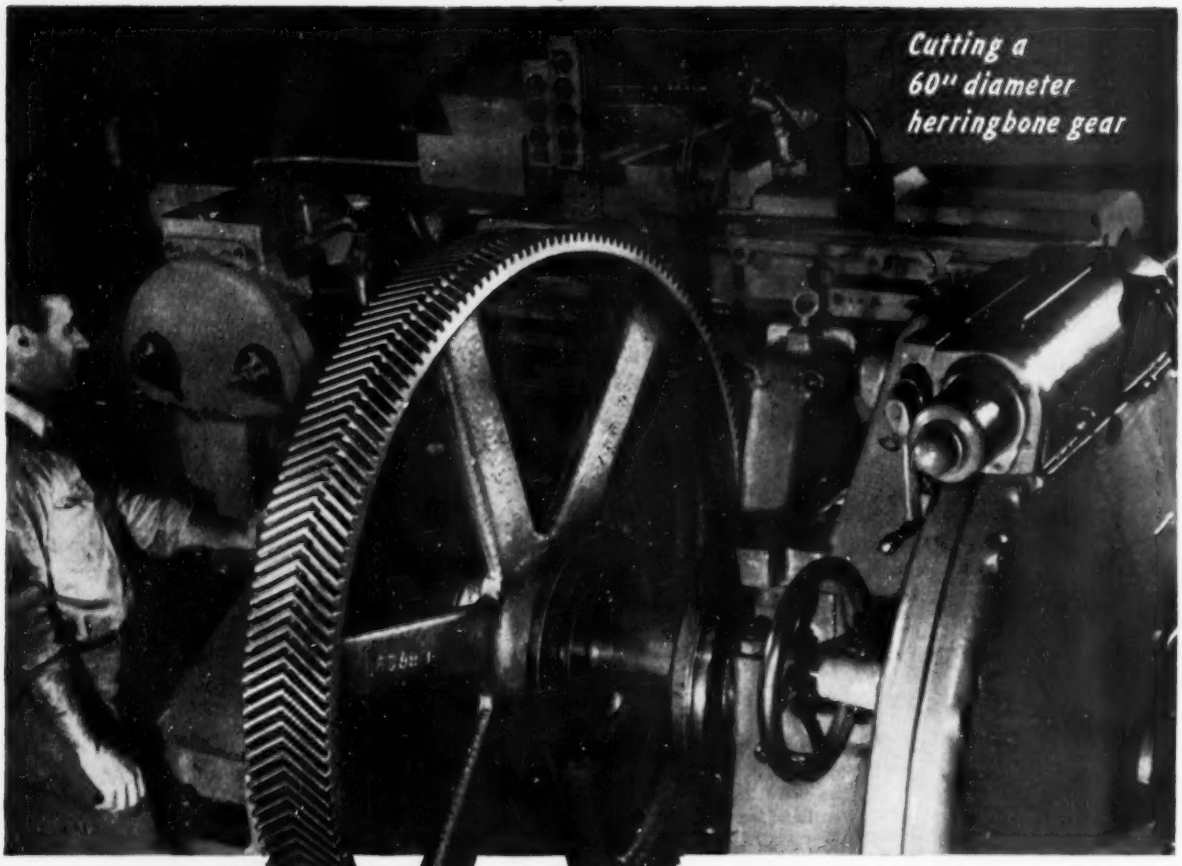

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Cutting a big herringbone gear like this isn't particularly difficult —that is, if the right equipment and experienced operators are available. Here at BRAD FOOTE we have a happy combination of efficient machines and capable men to cut any size, any type, or any quantity of herringbone gears you might need.

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WRITE FOR CATALOG No. 51

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UNITED designs Dies to meet difficult drawing requirements

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UNITED accurately engineered dies are helping many manufacturers produce in quantity end products that meet specific requirements.

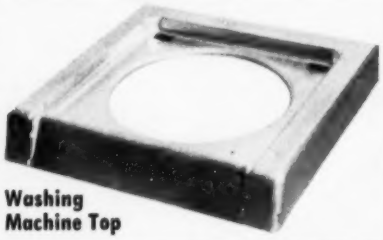
In many instances we have overcome deep drawing obstacles and have designed, developed and produced dies that not only meet exacting tolerances, but cut operating costs as well.

The two washing machine tops and dryer top illustrated are typical examples of work produced with United Dies. Large Cam Return Flange Dies were used to produce the correct flange form required for enameling in one operation.

If you are in the market for long lasting precision dies, consult UNITED. We have the Engineering Organization — complete Shop Facilities—and experienced "know-how" to produce precision dies that will enable you to solve difficult production problems.

Washing Machine Top

Dryer Top



Washing Machine Top

Contact UNITED on your Tool, Die, Jig and Fixture requirements

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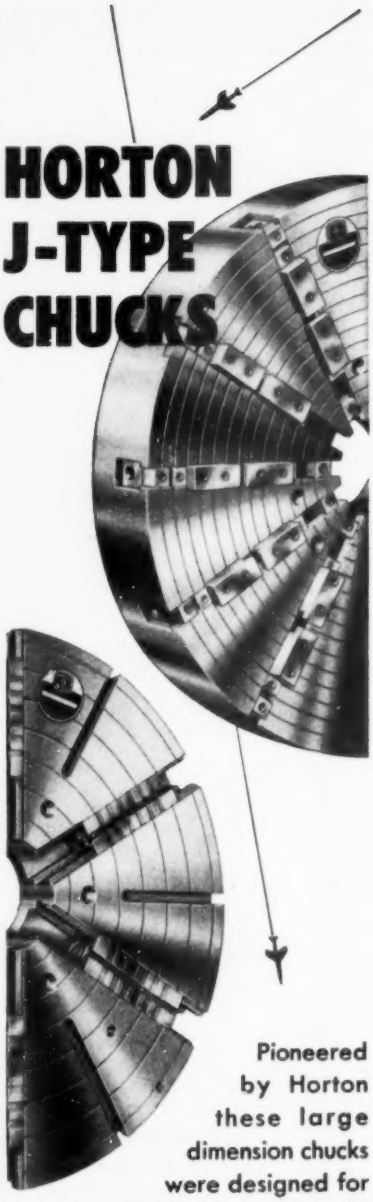
UNITED TOOL AND DIE, Inc.

SALEM, OHIO

TRADE MARK

HORTON J-TYPE CHUCKS



Pioneered by Horton these large dimension chucks were designed for the aircraft industry especially for machining various jet engine parts.

For 102 years Horton Chucks have kept pace with industry's demands.

HORTON CHUCK
Since 1851

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THE E. HORTON & SON CO.
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The LINLEY JIG BORER

Put your small jig boring jobs on this precision machine

Here's a machine, available at extremely low cost, that will enable you to save your larger machines for larger, heavier work. You'll find it meets your most exacting requirements for precision. Get our accuracy information and you'll see what an outstanding investment this machine represents. Table movement: 6" x 10"; table size, 7" x 17½".

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LINLEY BROTHERS CO.
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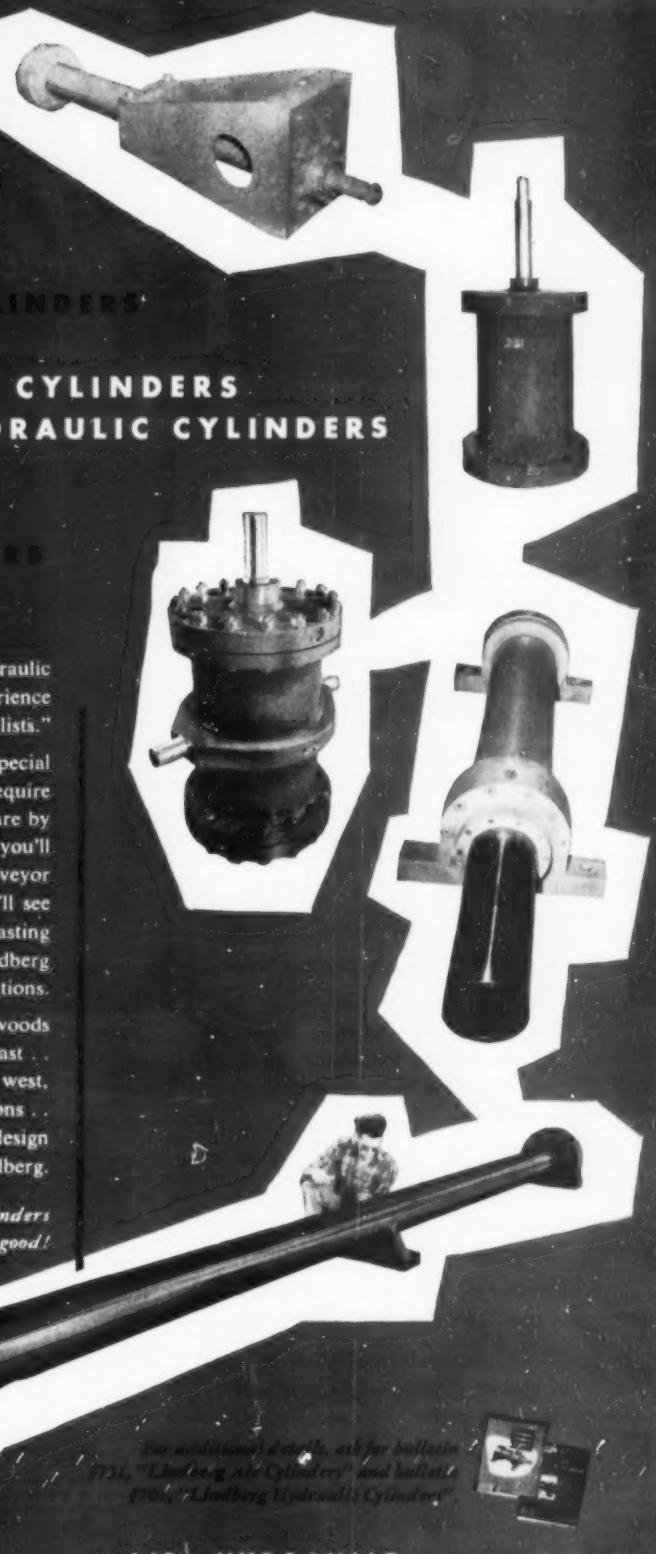
SPECIAL CYLINDERS

SHORT CYLINDERS

LONG CYLINDERS

LINDBERG AIR CYLINDERS HYDRAULIC CYLINDERS



Lindberg's full line of standard air and hydraulic cylinders is backed up by years of experience as "special cylinder specialists."

From coast to coast, you'll find that most of the special cylinder installations . . the tough jobs that require extra engineering skills and efforts . . are by Lindberg. In a mid-western sheet and tin mill, you'll see Lindberg Cylinders powering a conveyor system. In a southern aluminum plant, you'll see Lindberg Cylinders on aluminum ingot casting equipment. In an eastern steel plant, you'll see Lindberg Cylinders on large materials handling installations.

From out-of-the-way lumber camps in the north woods . . to sprawling textile plants in the southeast . . and busy food processing plants in the west, you'll find that the "special" installations . . the unusual installations . . the difficult-to-design installations are by Lindberg.

We also build a full line of standard cylinders which are just as good!

For additional details, ask for bulletin 1731, "Lindberg Air Cylinders" and bulletin 1701, "Lindberg Hydraulic Cylinders".

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Precision Flatness, Finish and Parallelity in Production Quantities . . .

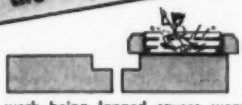
WITH A LAPMASTER

Here is the machine to do the job if you want precision flatness in production quantities at an economical rate. Lapmaster machines readily lap to the extreme close tolerance of one light band (0000116") or less. In addition, they produce an extremely fine finish to as low as 1 RMS.

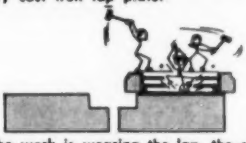
Check these features and investigate the possibilities for the Lapmaster in your plant.

1. Operator requires no previous lapping experience.
2. Automatic timer provides controlled lapping cycle for production efficiency and allows time for pre-loading workholders.
3. Simplicity of design allows ease of loading and unloading.
4. Loose abrasive distributed evenly over lapping area insures uniform results.
5. Serrated lap plate collects and disposes of spent compound and removed stock.
6. Precision laps identical parts or parts of various shapes, heights and materials in one cycle.
7. Self-conditioning lap plate eliminates down time for truing or replacement.

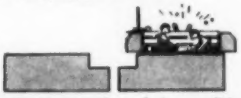
How the Lapmaster Works



The work being lapped causes wear on heavy cast iron lap plate.



As the work is wearing the lap, the conditioning rings are continually conditioning the lapping plate surface.



Since the wear action of the conditioning rings is greater than the wear caused by the work being lapped, the flatness of the lap plate is automatically maintained.

FREE DATA

Learn more about the possibilities of production lapping and the interesting subject of measuring flatness. The illustrated fact-filled booklets are yours for the asking. Write today.

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JOHN CRANE

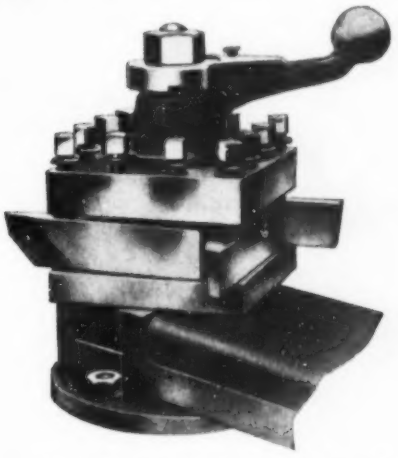
CRANE PACKING COMPANY

McCROSKY

COST CUTTING TOOLS

Turret TOOL POSTS

give engine lathes the advantages of turret lathes



● The successive tools needed for multiple operation jobs can be swung into cutting position quickly — indexed accurately in any of 12 indexing positions — and locked rigidly when you use a McCrosky Turret Tool Post. Thus multiple tool jobs become continuous, enabling engine lathes to handle — efficiently and economically — a wide variety of work that otherwise would require a turret lathe or other specialized machine.

McCrosky Tool Posts are ruggedly built and provide the rigidity necessary for making heavy cuts. They feature many service-proved advantages, available only in McCrosky design, that assure long, efficient, satisfactory operation. 5 different styles, including square and hexagon designs — 9 sizes — for mounting in the T-slot of the compound rest, or the bolt circle of the main slide. Used by leading concerns from coast to coast. **Endorsed by all well known lathe manufacturers.** Send for Bul. 17-T. It gives full details.

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Body can be bladed to rotate either right or left hand. Consequently, selecting blades with tips of proper material mounted at proper angles produces a cutter that meets any metal or machine condition. Write for Bulletin No. 531 today.

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Complete line includes chucking reamers with straight or tapered shanks, shell reamers with tapered holes for standard arbors or large straight holes for line bar reaming. Stock sizes from 15/16" to 6" diameter. High speed, cast alloy or carbide tipped blades. Write for Bulletin 18-R.

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McCROSKY *Block Type*
BORING BARS

Individually ground and hardened tapered V-key cente the block and cutting blades accurately and rigidly yet permits easy release for regrinding, and "floating" with extreme accuracy when making finishing cuts. Wide range of stock sizes. Write for Bul. 17-B.

McCROSKY *Wizard®*
QUICK-CHANGE CHUCKS

McCrosky's Wizard Quick-Change Chuck and Collet outfits hold tools centered and rigid. They enable the operator to change tools easily and quickly, without stopping or slowing down the spindle. Successive operation jobs become continuous. Write for Bulletin 18-C.

McCROSKY *Multiple Operation*
TOOLS

McCrosky "Specials" combine two or more related boring, facing, chamfering or reaming operations into a single tool saving set-up time and cutting costs. Engineered by McCrosky to your work prints. Write for Bulletin 17-S.

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MEADVILLE, PA.

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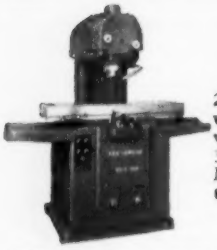
KENT-OWENS

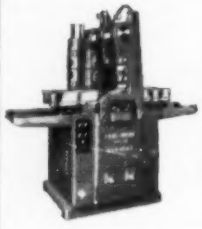
Speed and Accuracy!

More and more—Kent-Owens Machines get the call for countless milling jobs today—because they're *rugged . . . simple . . . versatile.* Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20
20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.



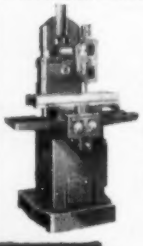
No. 2-20V
20" table travel... vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.



No. 2-20DS
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.

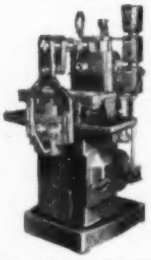
No. 1-14DS
Double Spindle for two milling operations at same time . . . 14" table travel . . . 32" x 9" table.

No. 1-M
Hand feed to table and head . . . 25" x 9" table . . . Adjustable head counter-balance.



No. 1-V
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.

No. 1-8
8" table travel . . . 25" x 9" table . . . automatic hydraulic table feed.



No. 1-14
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HUFFORD HYDRA-CURVE JAWS

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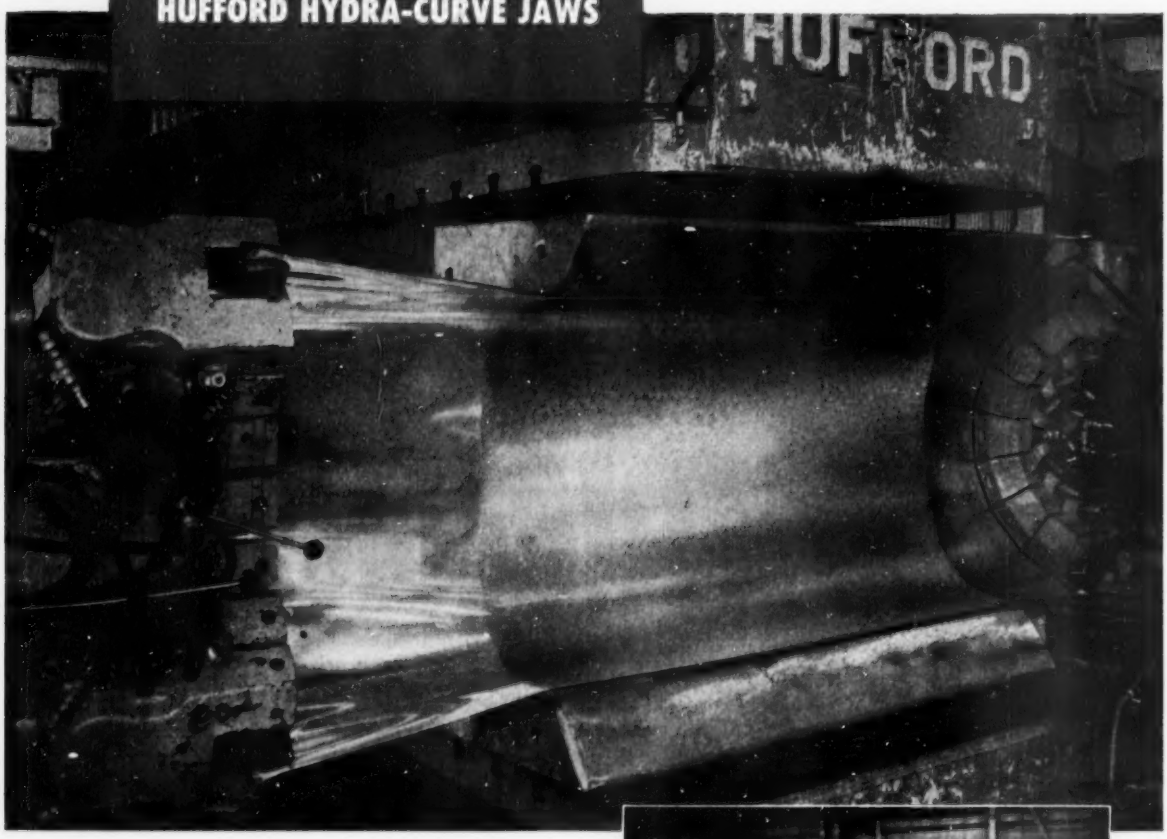

LESS STOCK USED—Vertical die curves no longer need to be *stretched* into the workpiece. Less stretching results in lower stressing. On deep curvatures this means *less stock required between die ends and jaws.* Result: Up to 30% savings in material.

DOLLAR SAVINGS—One manufacturer reports material savings of $335 per day, besides faster, easier forming and more accurate skin fits, which again cut costs.

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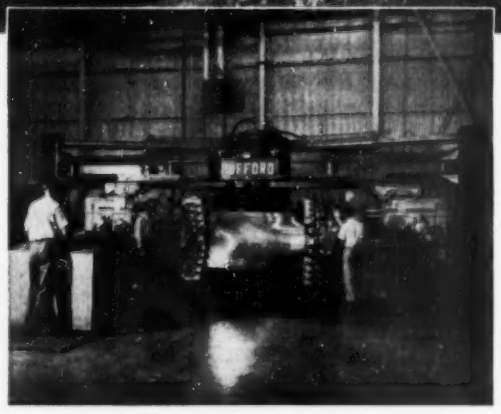
DIE COSTS CUT—Time consuming dish-outs in dies—to help reduce transitional stresses—are no longer necessary.



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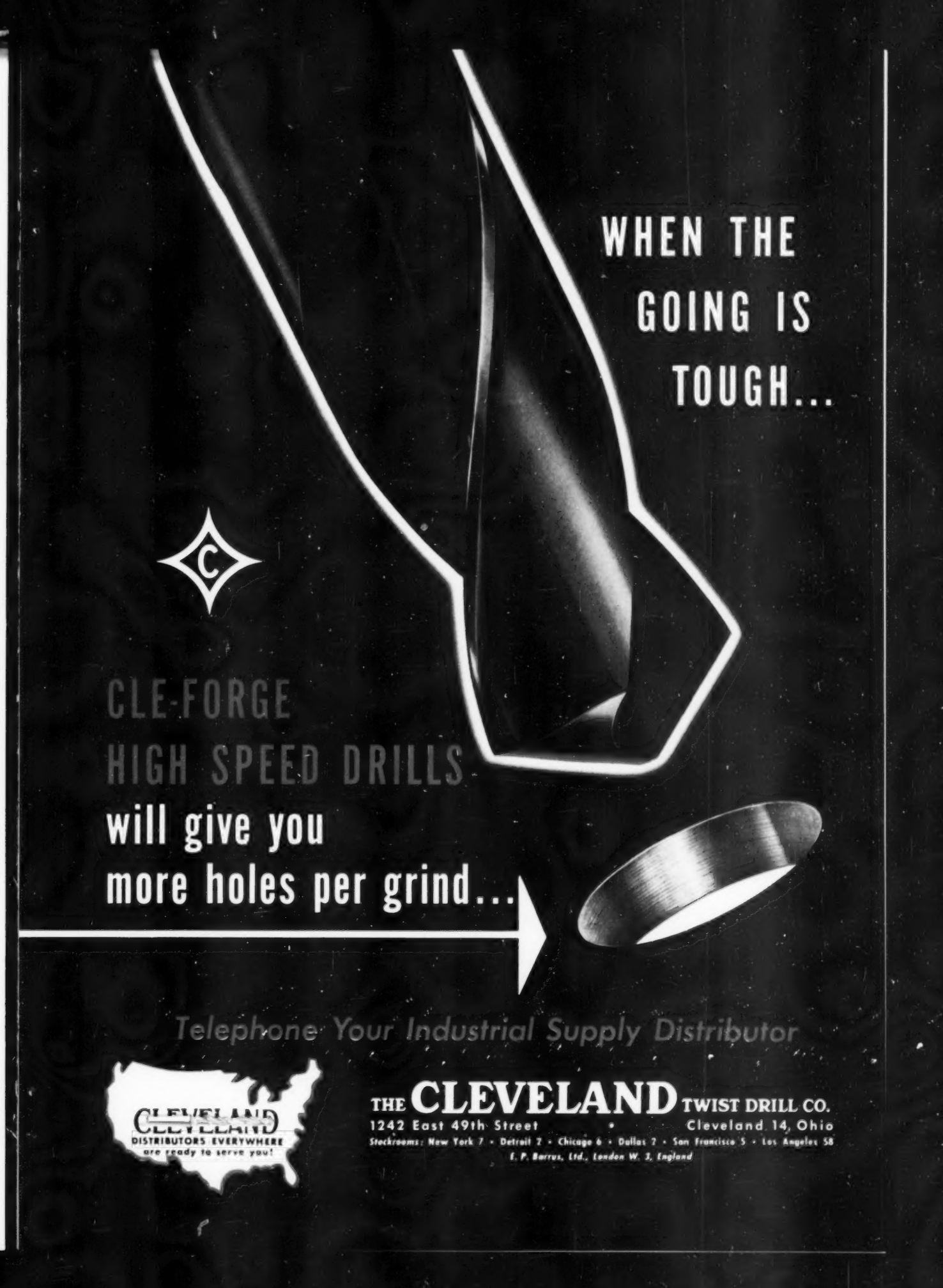
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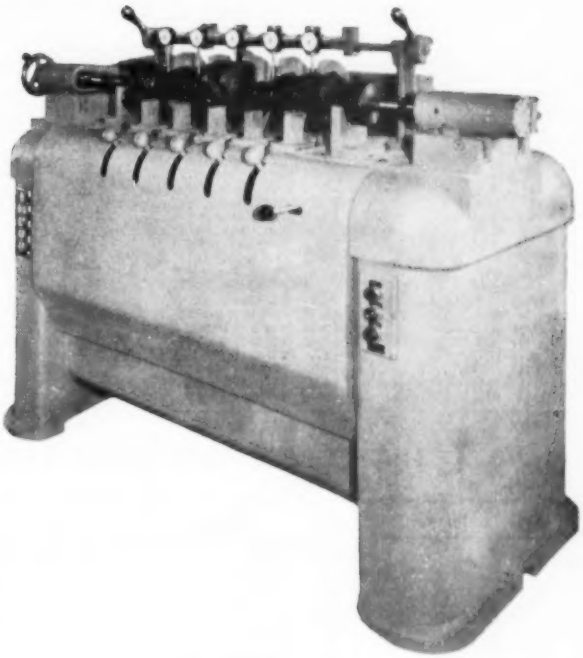

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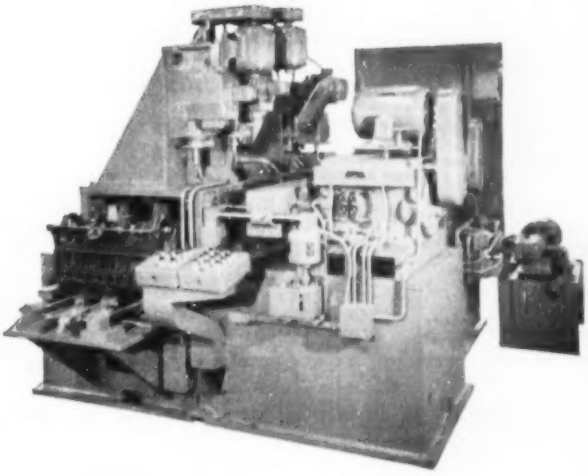

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5	30-32-36-40-48
6	30-40-48-56-60
7	32-48
8	24-30-36-38-40-44-48
9	24-28-32-40
10	24-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-40
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40

SIZE	THREAD
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-48
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1-3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5-1/2 - 8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24

SIZE	THREAD
1-3/4	8-10-12-14-16-18-20-24
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-28
2	4-1/2-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4-1/2 - 8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-10-12
2-9/16	16
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	8
4	8-12

HIGH SPEED LEFT HAND TAPS

SIZE	THREAD
0	80
1	56-64-72
2	56-64
3	56
4	32-36-40-48
5	40-44
6	32-36-40
8	32-36-40
10	24-30-32-40
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32

SIZE	THREAD
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16-24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18

SIZE	THREAD
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1 11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
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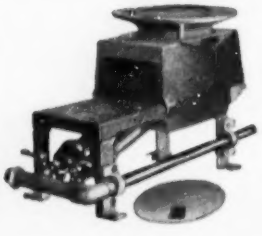

Here's speed, economy and lifetime service in this most efficient and economical soldering and general purpose bench furnace. This #22 furnace heats a pair of 12 lb. soldering coppers in 8 minutes. Can be used for melting lead, heating small tools, etc. Since 1911 BUZZER Soldering Furnaces have been the equipment of thousands of industrial plants, shops and schools.

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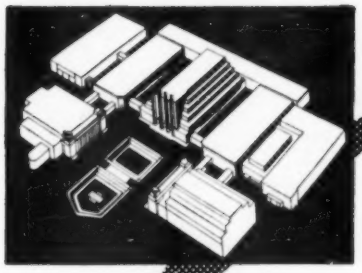

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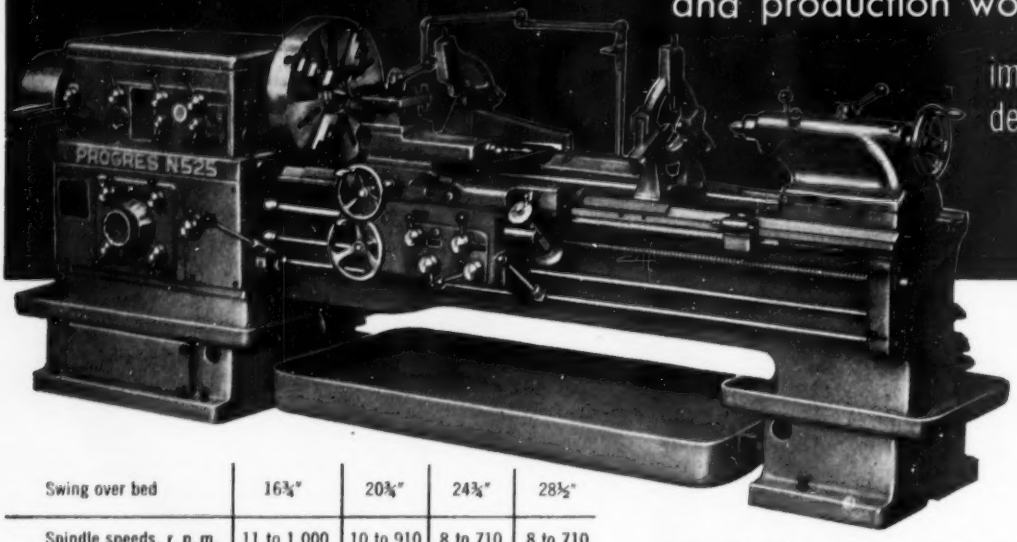

Swing over bed	16¾"	20¾"	24¾"	28½"
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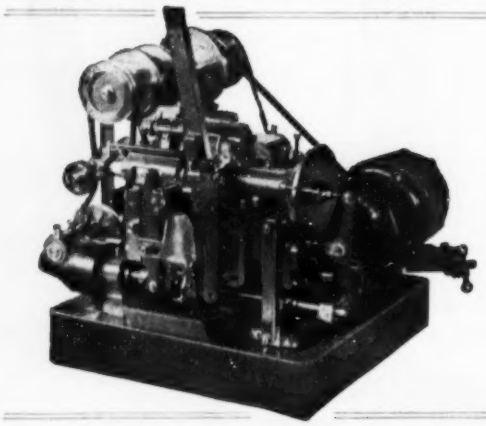

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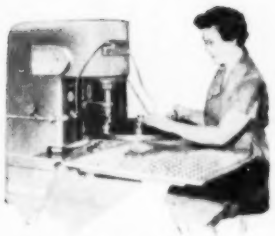
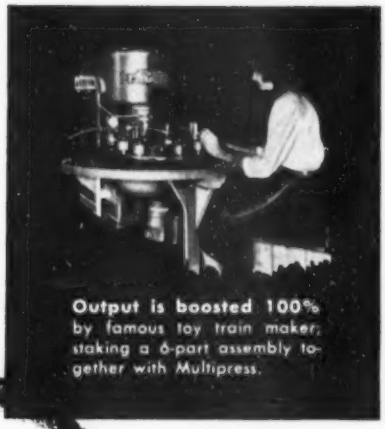
Assembly speed is doubled using Multipress to crimp a small brass contact to pen-type flashlight cases.



Scrap losses drop sharply as Multipress doubles staking speed on high precision voting-machine counter wheel assembly.



Output is boosted 100% by famous toy train maker staking a 6-part assembly together with Multipress.

MULTIPRESS® DOUBLES PRODUCTION SPEED

On Six More Typical Operations

Faster production, better quality, less scrap, safer operation, easier handling, quieter action, and other profit-boosting results are run-of-mine with Multipress.

In the six cases shown here, Multipress *doubled* production rates. Hundreds of other reports tell of gains ranging up to 8 and 10 times the speed of previous equipment.

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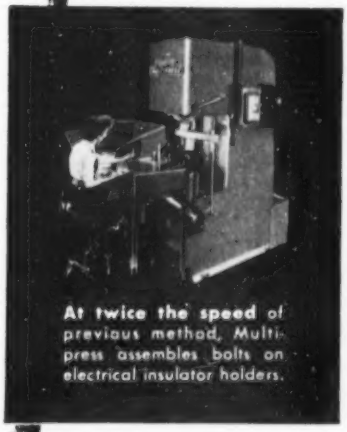
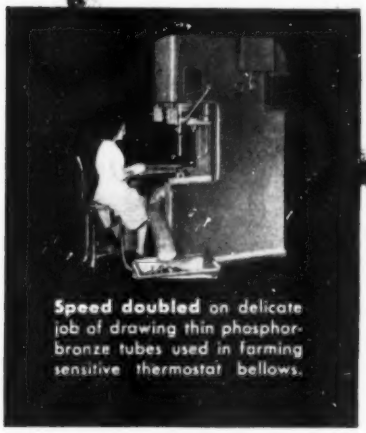
It is uniquely engineered to provide the smooth, controlled action of oil-hydraulic power *at its versatile best!* Infinitely adjustable ram pressures and stroke length make it easy to eliminate all unnecessary ram *travel* and ram *effort*. *Controlled* ram speed eliminates hammer-blow impact, cuts wear and tear on tooling, and permits better metal flow.

Multipress also offers standard attachments for extra efficiency on most production needs. It is easily equipped with automatic feeds, indexing tables, ejection devices, auxiliary ram actions . . . controls for automatic time-delay, hold-down, vibratory pressure application, sequence operations, etc. Multipress offers nine frame sizes . . . one-ton to 75-ton capacities. Write for details!

In only four stages, Multipress deep-draws a precision ordnance part formerly requiring 8 draws.



At twice the speed of previous method, Multipress assembles bolts on electrical insulator holders.



Speed doubled on delicate job of drawing thin phosphor-bronze tubes used in forming sensitive thermostat bellows.

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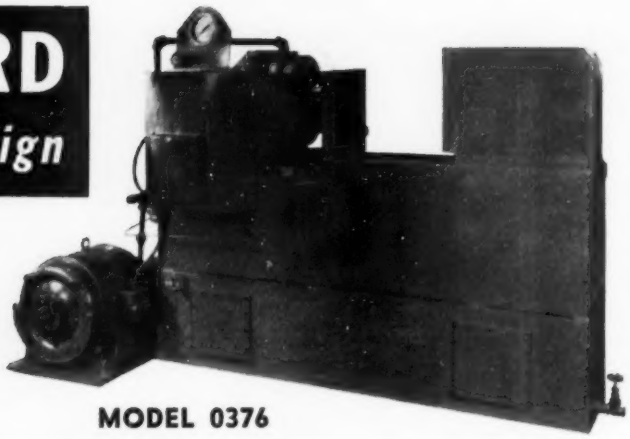
in hydraulic press design



MODEL 0376

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NO SCRAP LOSS
NO OVER-RIDING PRESSURE

For precise pressure applications, this horizontal type press is the last word in ADVANCED HYDRAULIC PRESS DESIGN BY M & N. The machine is push button operated, with automatic reversal at pressure setting. It is impossible for operators to over-ride the pressure with the resultant scrap loss in material, etc. It is also possible to operate this machine with the reversal feature out of the circuit where continuous pressure application is desired.

The machine can be had with single speed or the NEW M & N HYDRAULIC CIRCUIT, where a RAPID ADVANCE is desired with slow down for pressing speed at full load. Both circuits utilize a single pump, the only difference being in the manner in which it is installed. The dual speed machine is slightly higher in price. 50-100-150-200 Ton Capacity.

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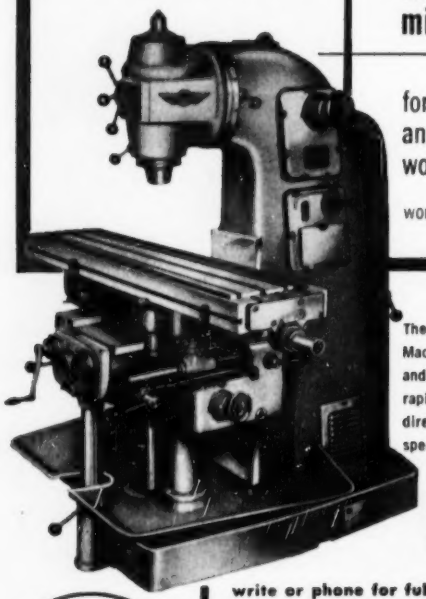

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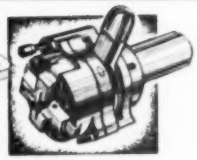

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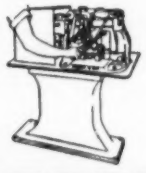

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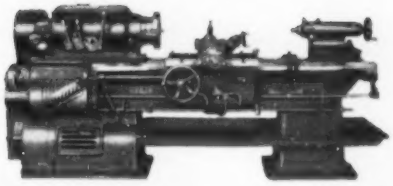

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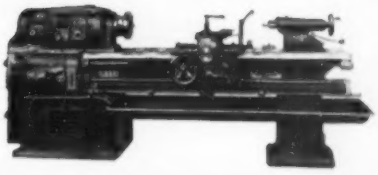

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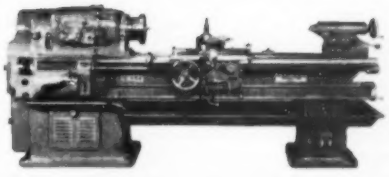
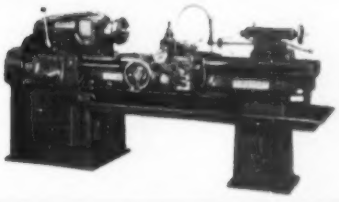
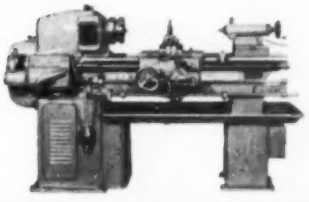


12" — 14" — 16" 12-speed Geared Head Lathes



No. 2 General Purpose Lathe



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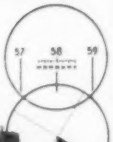

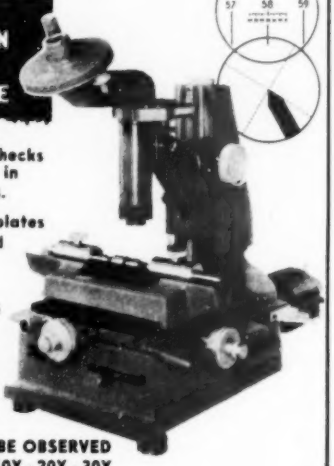

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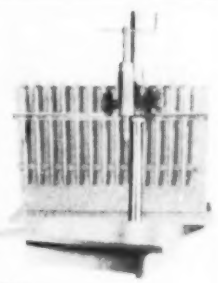

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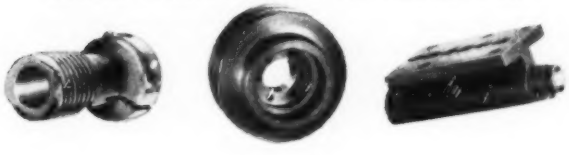

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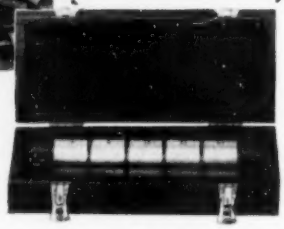

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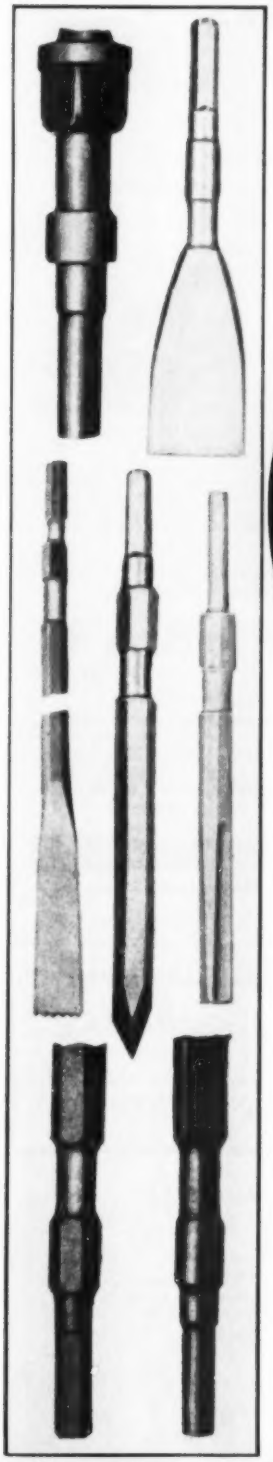

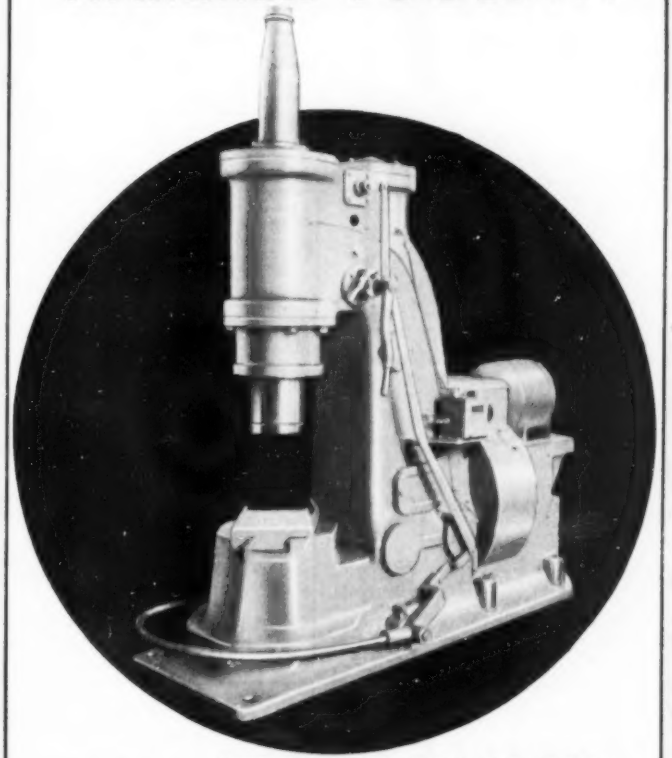

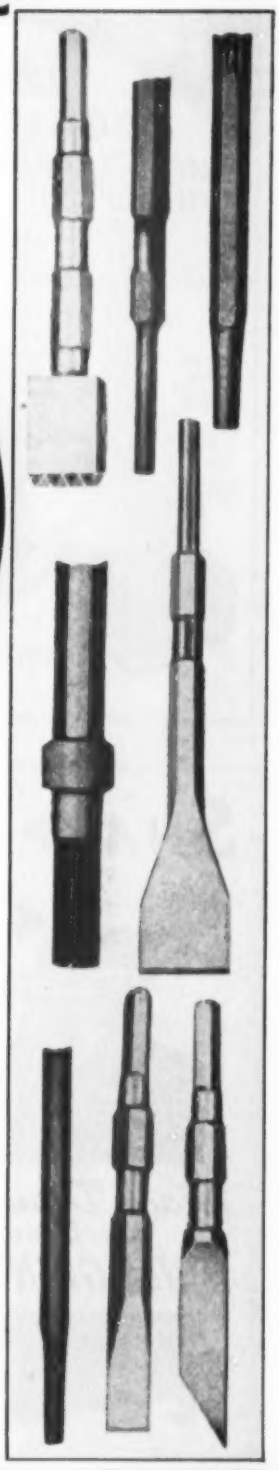

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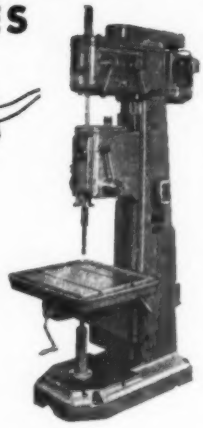

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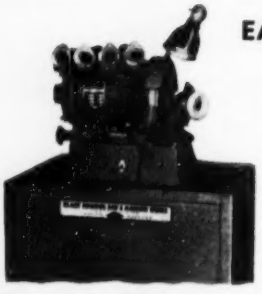

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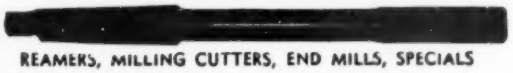

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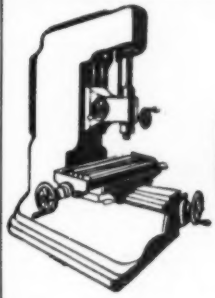

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2⅝" Cone 4 spdle., well equipped, 1936.
#24 New Britain 4 spdle. chucker, 2½" cap.
¾" Model F Gridley, 4 spdle.

2" 4 SPINDLE CONEMATIC, THREADING SPDLE., TAPPING ATTACHMENT, BAR FEED, CONSIDERABLE TOOLING. EXCELLENT CONDITION. 1943

BORING MILL
36" Bullard New Era, rail & side head
42" Bullard New Era, rail & side head

GRINDERS
#2 Oliver arc face mill cutter, 1943
#76RA Rogers knife grinder, 76", late
Cinn. Internal, 24" swing, 78" stroke
16x42" Landis Type D Crank Pin
14" Hammond WD carbide tool, late
#104 Rivett Universal, 1942, rebuilt
#4 Bryant Internal, auto. sizing
#33 Excello ext. groove, late type
#86—30" Gardner vert. disc grinder
14x36" Norton C semi-auto., cyl.
73 Heald Internal Centerless
73 Heald Internal, 1944, like new
P & W deep hole drill grinder, late
Model 1311 P & W contour, late

DRILLS
D-4 Colburn, #3 M.T., 3½" cap., 24" swing
5'13" Cinn. Bickford, mtr. on base
28" Cinn. sliding head, round col., older
Baker Hvy Dty, #5 M.T., p.f.
#2LMS Leland-Gifford, 26", hydraulic
#2 Allen, 2, 4, 6 spdle., #2 M.T.
Type 14 Natco 12 spindle
Model 4230 Bodine Drill & Tapper, 12 sta.
Moline Hole Hog, 2 spindle

GEAR MACHINERY
6" Gleason straight bevel generator
13LS Fellows lapper, late
7A Fellows, shaper high speed, hvy dty
61A Fellows, shaper, high speed precision

LATHES
13x30" South Bend toolroom, late
15 x 60" Cinn. Tray Top, toolroom, 1951
42"x26' ctrs American, High Duty, 16 speeds
30"x10' American geared head, taper att.
48"x35' LeBlond Hvy Dty, taper, late
Gisholt Simplimatic, platen type, late

TURRET LATHES
#3 J & L Univ. bar feed, 2" hole, late
#5 B & O Univ., chuck, pre-selector, late
#1A W & S Univ., 3" hole. #417756
#1L Gisholt Universal, 3" hole, 1937
Libby type H, 24" swing, 8 spdle. speeds
#2 Simmons Microspeed, air chuck, late
#3 Gisholt Universal, late

SHAPERS & PLANERS
30"x30"x17' Cleve. Openside
48x48x14' Detrick & Harvey dble. hsg.
26" Smith & Mills shaper, 4 step cone

MILLS
#2 B & S Vert., 7½ 4p, late
08 Cinn. horiz., rise & fall, 1943
08 Cinn. horiz., auto. cycle, 1943
#1½ B K & T horiz., dble. overarm, rebuilt
10C Van Norman Contour

THREADERS
8x16" Hanson-Whitney Universal, mill, late
6x80" P & W miller, splining & milling
#50 Excello Precision grinder, 28x68"
13" Automatic Machinery miller, late
#2 Dalzen grinder, 3" o.d. cap., late
LT636 Lees Bradner mill, 18 x 36", late
1½" Landis, 2 spdle., lead screw type

FURNACES
Whiting Converter, 2 ton cap., late
Model SP Suthe, gas, 1000° F
Lithdraw heat treat, 1200° F, late

PRESSES
#37 Excelsior dble. crank, 45 ton
250 ton Elmes hyd. shell nosing, 21½" str.
Ferracute type EG-52 embossing, 150 ton
#4 Toledo OBI, 25 ton. 2" stroke

MISCELLANEOUS
MAGNAFLUX: MA-3 production type, 3000 amp.
SHEAR: 12' 14 gauge Stamco, 10 HP
WELDER: Sciaky 40 KW press type spot
TAPPERS: Haskins 2CAM, 5/16" late
Cleve. Model EO, ½", late
WELDER: 75 KVA Federal spot, PA-1-18
KEYSEATER: #6-38 Mitts & Merrill, 4 x 36"
SPINNING RIVETER: Grant 5 spdle.
HAMMER: 300# Bradley Upright Helve
WELDERS: Hobart and P & H Arc, 400 amp.
BULLDOZERS: #2 Ajax High Speed, 30 ton

T. R. WIGGLESWORTH MACHINERY COMPANY
1719 SUPERIOR AVENUE • • • SUPERIOR 1-8727 • • • CLEVELAND 14, OHIO

OPEN TIME

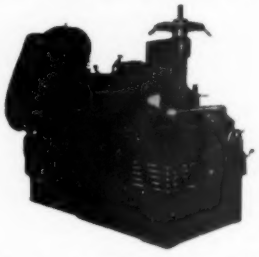
Turret Lathes (Bar and Chucking up to 2", Automatic Screw Machine—2¼" Capacity, Millers, Lathes up to 30"x10', Drill Presses, Welding, Plating, Heat Treating and Assembly. Can do parts or complete assemblies.

FRANKLIN MACHINE PRODUCTS CO., INC.
West Trenton, New Jersey

EXCELLENT
TOOL & CUTTER GRINDING
RETIPPING
Prompt—Efficient—Reliable
GRINDING & TOOL SERVICES CORP.
6025 Belfield Ave., VI 8-1700, Philadelphia 44, Pa.

OPEN CAPACITY
DEEP HOLE DRILLING & REAMING
To close tolerances in all metals including alloy & stainless steel, aluminum, etc. Capacity .180 to ⅝" holes x 80". Also adequate capacity for related secondary operations of grinding, turning, threading, plating etc.
JOHNSON AUTOMATICS Arms Co., Inc.
PO Box 1512, Providence 1, R.I.

LATE TYPE COLD SAW



#3 Motch & Merryweather High Speed Cold Saw.
Cap. 11½" round.
New 1942—M.D. 220-440/60/3
Priced reasonably.

#1½ Ajax Taper Forging Roll.
Motor driven—220-440/60/3

1" & 1½" Cone Vertical Auto. Screw Machines.
4 Sp.—For nuts and cutoff work—M.D.

Many other fine machines in stock

STROM MACHINERY CORP.
8810 S. VINCENNES AVE.
CHICAGO 20, ILL.
Hud. 3-5400

SEVERAL 20 x 96" MATTISON SURFACE GRINDERS
Available for Job Work

On grinding of steel flat shapes. Particularly interested in large runs where customer furnishes raw or partially finished material, where grinding only, is required.

CW-7078, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

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LARGE LATHE WORK
up to 80" Dia.
EISLER ENGINEERING CO., INC.
738 So. 13th St., Newark 3, N. J.

HEAVY DUTY ROUGH TURNING
GUNS—SHAFTS—ROTORS
FLANGES—CASTINGS
Experienced—Expedient—Inexpensive
TURNMETAL CORP.
6025 Belfield Ave., Phila. 44, Pa., VI 8-1700

PATTERNS in WOOD and METAL
For All Kinds of Castings Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us - we will take care of them
GENERAL PATTERN WORKS
2233 Burk Street Cincinnati, Ohio

CASH FOR MACHINERY
ONE PIECE OR COMPLETE PLANT
AJAX MACHINERY
2035 Michigan, Detroit WO-3-1015

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Highest prices paid for late type machine tools
Write – wire – phone
J&L MACHINERY & SUPPLY CO.
7906 Mack, Detroit, Mich.

BUY FROM STOCK
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BAKER 5887

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MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

AUTOMATIC #0 B & S Wire Feed Screw, Late.
AUTOMATIC, Cleveland Model #B-1½" Spl. Spdl.
AUTOMATIC #2 B & S Wire Feed, 1" screw, Cap.
AUTOMATIC, 2G Brown & Sharpe, Motor Driven

BALANCER, Anderson Bros. 14"x64", Roto-Checker.
BORING MILL, 24" Bullard M.D., V.T.L.
BORING MILL, 36" Bullard M.D., V.T.L.
BORING MILL, 36"x44" Niles Vert. M.D., Side Head.
BORING MILL, 2½" Lucas Horiz., M.D.
BORING MILL, Lucas Horiz. 3" Bar, M.D.
BORING MILL, Giddings & L. #0 Horiz. 3½" Bar.
BARRELS, Tumbling Lupomatic, Schutte & Koetring.
BRAKE, #335 Chicago, M.D., Press, 6' 15 ga., NEW.
BRAKE, #185 Chicago Power Apron, 6'x3/16" cap.

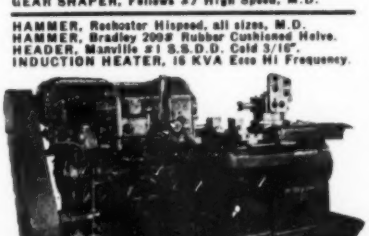
COMPRESSOR, Ingersoll Rand ER-1, 10 HP, M.D.
COMP., 15 HP, 10 HP, Gardner Denver, M.D., New.
COMPRESSOR, C-P 50 HP, M.D., 10x10, 278 CFM.
COMPRESSOR, Ing.-Rand ER-1, 100 HP Syn. M.D.
CRANE, GET Ricker 2 tons 11'9" span.
CRANE, Canton #8 Portable Gooseneck 3 ton cap.
CHIP WRINGER, 20" Tolhurst M.D., Late.

RADIAL DRILL, 3' 9" Mueller, M.D.
RADIAL DRILL, 4'x11" American, M.D.
RADIAL DRILL, 5'13" Cincinnati-Bickford, M.D.
RADIAL DRILL, 6'x15" Cincinnati-Bickford, M.D.
RADIAL DRILL, 30" Walker Turner M.D., Late.
DRILL, Fesdick 16", S.S. Power Feed, M.D.
DRILL, #2 Colburn H.D. #4 M.T., M.D.
DRILL, #121 Baker Auto. S.S. Cam Operated.
DRILL, Deep Hole, Avey-Draulic #2, M.D.
DRILL, Edlund #2B, 3 spdle. #2 M.T., 16"
DRILL, 4 & 6 Sp. Avey 12" overhang, #3 M.T., M.D.
DRILL, 4 Sp. Barnes H.D., M.D. #4 M.T., P.P.
DRILL, Cincinnati 21" with Tapping Attach, M.D.
DRILL, Natco Multiple Spdle. #12, #1 M.T., M.D.
DRILL PRESSES, Leland Gifford #1MS, 1, 2, 3, 4.
DRILL PRESS, #2MS Buffalo Forge single spindle.
DRILL, Barnes, 24" S.S. #4 M.T., 1¾" cap.
DRILL, PRESS, #23 Foote-Burt S.S. 24", #5 M.T.
DRILLS, #14, #15, #16, #18 Buffalo Forge, M.D.
DEEPFREEZE Motor Products 40 below zero.
DEMAGNETIZER, SB-911 Magnaflux, late type.

FACING HEADS, 20" & 24" Mummert-Dixon.
FILER, #11-S Cochrane Bly Auto Saw Filer.
FILER, Type P4, Oliver Floor Type, M.D.
FURNACE, Westinghouse Elec. 18 KW. 2100° F. cap.

GRINDER, M.D. Sanford Surf. 8"x12" cap., New.
GRINDER, #1 Wilmarth Norman Hand Surf., 6"x12".
GRINDER, #2 Imperia Univ. Tool & Cutter, New.
GRINDER, #2 Brown & Sharpe Sur. 6"x18" cap., M.D.
GRINDER, 6"x18" Thompson "F" Hyd., Late.
GRINDER, #4 G & L Univ. Tool & Cutter, M.D.
GRINDER, Disc, Besly #20S, 18" Dble End.
GRINDER, Heald Rotary #25, M.D. 16" Cap.
GRINDER, Cylindrical, Norton 10"x24", M.D.
GRINDER, Brown & Sharpe #4 Univ. 12"x60".
GRINDER, Thread, Jones & Lamson #TG-615, Late.
GRINDER, Heald #72A-3 Internal Size-Matic.
GRINDER, 14"x36" Pratt & Whitney Vert. Surf.
GRINDER, Pratt & Whitney 22"x84" Vert. Surface.
GRINDER, Greenfield #12 Int. Hydromatic, M.D.
GRINDER, Oliver Auto. M.D. Drillpointer, #510.
GRINDER, #33 Abrasive Vert. Auto. Surface, M.D.
GRINDER, #22 Heald Horiz. Rotary Surface, M.D.
GRINDER, Diamond Snagging 10 HP, 24"x4¼".
GRINDER, Norton 6x18 Vert. Surface, Hyd. Late.
GRINDER, #60 & #70 Heald Internal.
GRINDER, Landis 6"x18" Hyd. Cyl. late type, M.D.
GRINDER, Sellers Type #1A Tool, 24" wheel.
GRINDER, 37" Wheel Dia. Osterheld Disc, 24" cap.
GRINDER, 30" Ingersoll Tob Face Mill, M.D.
GRINDER #79-72" Gardner Vert. Spindle, Late.
GRINDER, #214—30" Besly Double End Disc, Late.
PROFILE GRINDER, Studer Type PSM, M.D., late.
GEAR LAPPER, #8LS, #13LS Follows, Outboard Supports. Detachable Laphead, Late.
GEAR SHAPER, Follows #6 High Speed, M.D.
GEAR SHAPER, Follows #7 High Speed, M.D.

HAMMER, Rochester Hispeed, all sizes, M.D.
HAMMER, Bradley 2008 Rubber Cushioned Helve.
HEADER, Manville #1 S.S.D.D. Cold 3/16".
INDUCTION HEATER, 16 KVA Ecco Hi Frequency.

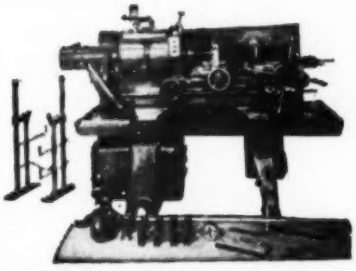


4DE POTTER & JOHNSTON Automatic Turret Lathe, Motor Driven, T.E.F.C. 7½ HP. 3/60.220/440.

INDUCTION HEATER, 30 KW Lepel, Late Type.
AIR MOTOR HOIST, Ingersoll Rand 2000# cap.
ELECTRIC HOISTS, 500-4000 lbs. Whiting, NEW.
HONE, #194 Barnes Vertical, M.D., Hyd. Late.

KEYSEATER, #5 Mitts & Merrill, Giant, M.D.
LAPPER, 2F Norton Vert., M.D., late type.

No. 7 BARDONS & OLIVER Geared Head
Full Universal Turret Lathe, Preselector Head, Bar Feed, 4" capacity through spindle. Late Type, Motor Driven.

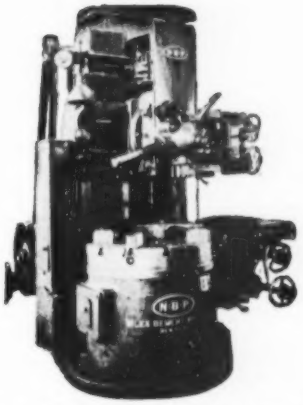


#2 WARNER & SWASEY Geared Head Turret Lathe, 12 Spindle Speeds, Bar Feed.

LATHE, Le-Swing 8"x108", M.D., A.C. Rebuilt.
LATHE, Porter-Cable 9"x15" Geared Head Prod.
LATHE, #6 WSL Reid Smallpiece Prod., Late Type.
LATHE, Hendey 12"x5' Q.C.G. Taper Attach. M.D.
LATHE, LeBlond 14"x6', Q.C.G., M.D.
LATHE, Hendey 14"x8' Q.C.G. Taper Attach. M.D.
LATHE, American 16"x6' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 18"x7' Q.C.G., M.D.
LATHE, American 18"x10' Q.C.G., Grd. Hd.
LATHE, South Bend 18/28"x8' Gap Bed, Q.C.G. M.D.
LATHE, Reed-Prentice 20"x10' Grd. Hd. M.D.
LATHE, LeBlond 22"x10' Q.C.G., M.D.
LATHE, 24"x12' Beye & Emmes Grd. Hd., T.A., Late.
LATHE, Putnam 23/32"x12' Q.C.G., M.D.
LATHE, LeBlond 24"x14' Q.C.G., Grd. Hd.
LATHE, Lodge & Shipley 26"x14', Q.C.G., M.D.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, 27"x16' Niles Timesaver, Grd. Hd., M.D.
LATHE, Bridgeford 32"x16' Q.C.G., Grd. Hd.
LATHE, 42"x18' Pittsburgh Geared Head, M.D.
LATHE, Bullng Dble. End #VMT5, Devine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret, #2 Simmons Vari Drive 220 V.
LATHE, Turret #2 W & S Univ. Grd. Hd., Late.
LATHE, Turret, #4 Warner & Swasey Univ. 1½".
LATHE, Turret #4DE Potter & Johnston Auto., 1942.
LATHE, Turret #6 Warner & Swasey Grd. Hd. Ram Type, Bar Feed, Motor in base.
LATHE, Turret #7 Bardons & Oliver, 4" cap., Late
LATHE, Turret #2 Cinci. Acme Univ. Geared Head.
LATHE, Turret, #3A Warner & Swasey Univ. M.D.
LIFT TRUCKS, Baker 1 & 2 ton, Platform & Fork.

MILL, #4 Burke Motor Driven, Late, M.D.
MILL, #2 Pratt & Whitney Prod. Duplex, M.D.
MILL, #3VB Hardinge Vert. Bench, M.D.
MILL, #4B Brown & Sharpe H.D., Horiz. M.D.
MILL, #14 Garvin Plain Horiz., M.D.
MILL, #0Y Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cinci. Horiz. #3, #4, #5 High Power, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #0-8 Cinci. Vert. Prod. Late, M.D.
MULT-MILLER, U.S. Tool #MM-1-6 Auto. Prod.
MILL, #0 Douglas Plain Horiz. M.D., Coolant
MILL, #0 Sundstrand Rigidmil Hyd. Late Type
MILL, #0 Vernon Hand Mill, M.D., Late.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILL, #2SP Van Norman Horiz. M.D., Late.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILL, #3 Cinc. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #2 Vert. M.D. Brown & Sharpe.
MILL, #3 Cinci. Vertical Hi Power, M.D.
MILL, #5C Becker Vert. Die Sinker, M.D.
MILL, 42"x36"x12' Ingersoll Planer Type, 4 hds.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen. Electric, 100 K.W.
NIBBLER, #136 Savage 36"x1/16" Cap., M.D.
NAILING MACHINE, No. 16—48"-54" Morgan, Late.

THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL, 7½x11 Hanson-Whitney, Univ.
THREAD MILL, 6x14 Pratt & Whitney No. 1105.
THREAD MILLER, Lees-Bradner #40A Automatic.
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, Late.



36" x 44" Niles Vertical Boring Mill, Side Head, Motor Driven.

#40A Lees-Bradner Automatic Chucking Thread Mill, Motor Driven, Late Type.

PAPER SHREDDER, No. 10 Mitts & Merrill, M.D.
PLANER, Cincinnati 30"x30"x12' A.C., M.D.
POWER PRESS, Bliss #164 Open Back, M.D.
POWER PRESS, Bliss #4A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x26" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #163-B Straight Side Dble. Crank 45 tons, M.D.
PRESS, #2½ & #6 Toledo, OBI, Motor Driven
PRESS, D72 & DG73 Ferracute, Redraw, M.D.
PRESS, #5 Johnson OBI, 56 tons, new.
PRESS, #7 & #8 Johnson OBI 75 & 90 tons, New.
PRESS, 135 Ton Clearing Single Crank 8" Str., Late.
PRESS, 70H & 125PA Drake Hyd. Arbor, New.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRESS, Bliss #18, #19, #20, #21, OBI, A.C., M.D.
PRESS, Waterbury-Farrel High Speed 60 tons #3W.
PRESS, 60 C Bliss Double Action, 3 crank.
PRESS, Lucas 15 tons Power Arbor, M.D.
PRESS, #60 Whitney Deep Thr. 24", foot.
PRESS, P2, P3 Ferracute M.D. Roll feed.
WHEEL PRESS, 600 ton Niles Bement Pond, A.C.
PANTOGRAPH, #1A Gorton M.D. Engraving.
PUNCH, #48 Buffalo Forge Vert. Cap. 1"x1½" M.D.
PUNCH, R-4 Wiedemann Turret, 10 Stat. 24" thr.
PUNCH, Hecker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Sgle. End. 24" Thr. 1" thru 1".
PUNCH, H & J #4, 48" thr., with Shear Blades.

RIVET SETTER, ⅜" cap. Penn. Tubular Rivet.
ROLLS, Bertsch Pyramid 10'x1¾" cap., M.D., Late.
ROLLS, #1 Buffalo Forge Wrapping, M.D.
ROLLS, 72"x½" Lewis Initial M.D., New.
ROLLS, #2 Buffalo Forge Vert. Angle, Bending, New.

COLD SAW, Wagner 10"x10" cap., M.D.
COLD SAW, Espoo-Lucas #700, 48" dia. blade, M.D.
CUT-OFF SAW, Yates-American #M-90, M.D.
SAW, #4B Marvel Hack Saw 6"x8" Cap., M.D.
SAW, #20-C Racine Shear Cut 6"x8" cap., M.D.
SAW, Band Tannewitz GH-36" High Speed, M.D.
SHAPER, 16" Pratt & Whitney Crank, M.D., New.
SHAPER, 20" Rockford Univ. M.D., Tilting Table.
SHAPER, G & E 24", high duty, back geared, M.D.
SHAPER, 32" Cinci., B.G., Motor Driven, H.D.
SHAPER, Morton, 36" Draw-Cut, 4 speed M.D.
SHEAR, #26 Buffalo Forge Slitting Armor Plate.
SHEAR, Quickwork #11 Rotary Gap Throat, 10 ga.
SHEAR, 10' x 10 ga. Wysong & Miles, M.D., New.
SCREW SLOTTER, #2 Waterbury Farrel Auto.
SLOTTER, 17" New Haven Vertical, M.D.
SPRU CUTTER, Milwaukee 56 tons, 2½ cap., M.D.
SURFACE PLATES & TABLES, all sizes.
TAPPER, #1 Cam Haskins, Motor Driven, Late.
TAPPER, #1 Bakewell (Warner & Swasey) Late.
TRUCK, 2000 lbs. Hyster Fork Lift 9' Model QT-20.
TRUCK, 4000 lbs. LT-44 Towmotor Fork, Lift 9'.
BRINELL TESTER MACHINE, Type UK300M.
BRINELL TESTER, Type 03DR, Steel City.
WELDER, 500 amp. Westinghouse Flexarc A.C.
WELDER, 200 & 400 amps. Gen. Elec. Portable Arc.
WELDER, 75 KVA Federal M.D., Spot.
WELDER, 200 KVA Federal, Projection.
WIRE STITCHER, Morrison & Acme, M. D.

OVER 2000 MACHINE TOOLS AVAILABLE IN STOCK

UNUSUAL BUYS WITH *GUARANTEED* PERFORMANCE

PARTIAL LIST OF LATHES

American 30"x12', 3 SCD, 6' centers.
American 30"x14' G.H., 12 spindle speeds.
American 16"x8' bed, 3 SCD, bowl head.
American 14"x6', 3 SCD bowl head.
American 30"x10' bed Geared Head, 12 spindle speeds, 2-9/16" hole in spindle, vee belt drive.
American 20"x14' bed Geared Head, 12 spindle speeds, drop lever handles in apron, vee belt drive.
Boye & Emmes 20"x10', G.H., complete with taper attachment.
Greaves Klusman 22"x8' G.H. Lathe, complete with taper attachment.
Hendey 20"x10' bed Gearel Head, 8 spindle speeds, 1½" hole in spindle.
LeBlond 17"x8' bed 3 SCD.
LeBlond 27"x10', 3 SCD Lathe, 3'11" centers.
LeBlond 25-50 x 6/10 Sliding Bed Gap Lathe, G.H., Timken bearing.
Lodge & Shipley 14"x5' G.H., single pulley drive, 12 spindle speeds, 20" centers.
Lodge & Shipley 16"x120" centers G.H., Timken bearing, drop lever handles in apron, late type.
Lodge & Shipley 16"x6', single pulley.
Lodge & Shipley 30" x 12' bed G.H., 12 spindle speeds, 62" centers.

TURRET LATHES

Acme #2 Full Universal, single pulley drive, hole thru spindle 3½".
Gisholt 1-L Saddle Type Turret Lathe, with bar feed, late type.
Oster 601 Rapiduction.

BORING MILLS—Vertical

Betts 100", two heads on rail.
Bullard 42", AC motor drive.
King 52" two heads on rail, DC motor drive with generator set.
Niles 36"-44", 1 rail and 1 side head.
Niles 42"x50" Driving Box Borer, Burnisher and Facer, motor driven, late type.
42-50 Niles Vertical Boring Mill, one rail and one side head, late.

GEAR MACHINERY

Fellows 612 Spur Gear Shaper.
Fellows 725 Gear Shaper, with spur guide.
Gould & Eberhardt 18-H Hobber.
Gould & Eberhardt 96H Gear Hobber.
Gould & Eberhardt 60BM Gear Rougher.

GRINDERS—Cutter & Tool

Oliver Template Tool Bit Grinder, late.
Sellers 4T Tool Grinder, late type.
Sellers 6T Tool Grinder, late type.

GRINDERS—Internal

Heald 78 Centerless, Internal & Cylindrical, late type.
Heald #50, tight & loose pulley.
Heald #70A, new 1941.
Heald 72A3 Plain Internal Grinder, late type.

GRINDERS—Cylindrical

Landis 26"x168" centers Plain, arranged for motor drive with motors, 10 speeds 3 to 62.
Landis #2 Universal, 12"x35" centers, belt drive.
Norton 12"x48 Universal Hydraulic, late type.

GRINDERS—Thread

Jones & Lamson 8x31, late type.

MILLERS—Auto. or Prod.

Hall Style "D" Planetary Mill, late type.
Ohio 40" Tilted Rotary Miller.
U. S. Multi-Miller, Model 1-5-2, late type.

MILLERS—Plain

Brown & Sharpe #3, 4 SCD.
Cincinnati #4, single pulley drive.
Douglas #0, rectangular overarm.
Milwaukee 2 HL Plain Mill, late type.

MILLERS—Vertical

Brown & Sharpe #3, single pulley drive.

MILLERS—Universal

Brown & Sharpe 3A, motor in base.

DRILLS—Radial

American 5'14" column, Triple Purpose.
Fosdick 6'15", Heavy Duty Radial Drill.

PLANERS

Pond 48x48x16' Double Housing, DC drive, 4 heads.

SHAPERS

Averbeck 21" B.G., 4 SCD.
Columbia 28" B.G., gear box drive.
Gould & Eberhardt 20", B.G., gear box.
Gould & Eberhardt 24" B.G., gear box.
Gould & Eberhardt 28" B.G., gear box.
Gould & Eberhardt 32" B.G., gear box.
Potter & Johnston 24" Universal.
Smith & Mills 25" B.G., 4 SCD.

BOREMATIC

Heald #42, late type.

MISCELLANEOUS MACHINERY

Fitchburg 48" Spline Grinder, late type.
H&G Model I-K Threading Machine, late.
Hobart 200 Amp Arc Welder, late type.
Hoffman Heavy Duty Portable Cleaner.
Speedare 150 Amp Welder, late type.
Taft Pierce Bench Center, 8"x48" centers.

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HYDRAULIC PRESS

1500 TON CAPACITY

MANUFACTURER
Baldwin Southwark, SO #66340

RAM
36½" Dia., 36" stroke

NO. OF POSTS WITH CENTER LINE SPACE
4 posts 8-11/16" diam., 35½" left to right, 21½" front to back

DAYLIGHT OPENING
89⅞"

SIZE OF STATIONARY PRESSURE PLATE
Bottom pressure plate: 30" left to right 32½" front to back

PRESSURE PLATE ON RAM
32" left to right, 42" front to back

TYPE OF PUMP EQUIPMENT
2–28.2 G PM Northern Radial piston (one is spare)
1–19.2 G PM Servo Piston type

MOTORS
1–50 H.P. 440 V G.E. induction, for applying pressure
1–3 H.P. 440 V G.E. induction, for controls

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9215 Riverview Drive St. Louis, Missouri

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USED MACHINERY

Landis 20"x72" and 18"x96" Plain Ext. Grinders.
Hanchett 25 H.P. Sp. Vert. Hydr. Surf. Grinder 12"x48" table.
W & S No. 2-A Grd. Hd. Univ. Turret Lathe chucking.
Rivett No. 104 A.C. M.D. Internal Grinder.
Milwaukee Nos. 2-B & 3-B Horiz. Plain Millers D.O.
Cincinnati 36"x36"x10' D.H. Planer 2 Hds. Box Table.
Heald No. 72A-3 Hydr. Int. Grinder Red Head Sp.
LeBlond 27"x12' Bed Grd. Hd. Q.C.G. Lathe 13" hollow spindle.
Norton 6x18" Horiz. Hand Surf. Grinder 1941.
Cincinnati No. 2 Hi-Power S.P.D. Vert. Miller.
G & L 3" Bar Horiz. Boring Mill.
20" All Grd. Camel Back Drill 1-Sp. and Barnes.
Amer. 3' & Morris 3½' Arm Radial Drills.
Blanchard M.D. Vert. Sp. Surf Grinder 26" chuck.
Campbell No. 213 abrasive cut off 1947.
Sundstrand 4-Sp. Vert. Rigidmill.
Heald #22 Rot. Surf. Grinder 12" chuck 1947.
Nazel #3-B Vert. Air Hammer A.C. M.D.
Landis 2-Sp. 2" Cap. Bolt Threader M.D.
Hendey 16"x8' bed Q.C.G. Lathe 1939.
W & S No. 4 Ram Type Grd. Hd. Turret Lathe.
G & E 24" Gear Box Shaper Tilt. Table Top.
Newton 48" Table 1-Sp. Cont. Vert. Miller.
Foster 2-F Fastermatic Hyd. Turret Lathe.
Kempsmith No. 2 Vertical Maximiller M.D.
Heald #70-A Red Head Sp. Internal Grinder.
Springfield Planer Type Surf. Grinder.
P & J #2 Auto. Prod. Miller, 2 Tables.
Foote-Burt #25 Box. Col. 1-Sp. Hvy. Drill.
L & N, 8', 10' & 12' Press Brakes.
Bullard 24" & 36" Vert. Turret Lathes.
Lynd-Farquhar 26" stroke openside Shaper Planer.

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CAM MILLERS

VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

CENTERING MACHINES

SUNDSTRAND: 44" Double End Centering Machine

CUTTER & TOOL GRINDERS

FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New) automatic indexing

DRILLING MACHINES

ALLEN: #2 High Speed, 15" overhang
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
SUNDSTRAND: 44" Double End Centering Machine

GEAR CUTTING MACHINES

BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 1¾ D. P. capacity
CLEVELAND: Model 130 Gear Hobber (like new)
CLEVELAND: Model 140 Gear Hobber (like new)
FELLOWS: 61A Shaper, 18" dia.
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: 72 Shaper, 7" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Gear
SYKES: Gear Shaper 14" external, 20" internal (New)
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)

GEAR AND SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x 24" Hydr. Spur Gears and Splines

GEAR FINISHERS & TESTERS

FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 capacity 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain

3-WAY GUARANTEE

1. Should any machinery purchased from us prove unsatisfactory, you can return the machines within 30 days, via freight prepaid to our plant, and a full refund will be made.
2. Machines at our plant can be demonstrated and tested under power before purchasing.
3. You are dealing with a well-established, highly-rated firm of machinery engineers with over 33 years of proven responsibility.

LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE

GEAR GRIND MACH.: GG-19, 10"x 24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed

GRINDERS—INTERNAL

BRYANT, 16-16 Internal Hydraulic
BRYANT: No. 5Y Internal
HEALD: 72A3 Sizematic Centerless

GRINDERS—RADIUS

VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #639, capacity 7"
VAN NORMAN: #649, capacity 6" to 16" diameter
VAN NORMAN: #3½ Un. Radius

GRINDERS—THREAD

EXCELLO: #31 External, dia. 5"x18"
JONES & LAMSON: #636 Universal, 6" dia. x 36" centers and one extra multiform wheel dressing attachment

HONING MACHINES

MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia.

LAPPING MACHINES

FELLOWS: 8LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES PRODUCTION

BLOUNT: Polishing speed lathe 12" dia. x 48" centers
H.E.B.: High production hydraulic duplicating and copying lathes (new)
LODGE & SHIPLEY: #3A Duomatic. 25½" swing x 27" centers
POTTER & JOHNSTON: #6 DREL Automatic
New Engine Lathe 27" swing x 23' centers

LATHES—TURRET

WARNER & SWASEY 1A & 2A Turret Lathes
WARNER & SWASEY #3, #4 & #5 Turret Lathes
HERBERT: #2, #4, #7, and #8 Sizes (new)
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES

TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

SAWS & CUT-OFF MACHINES

CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: CT-36 Thread Miller chucking type, 13⅛" hole.
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity, single spindle
NATCO: Vertical Tapper 16 spindle

WIRE FORMING MACHINES

BAIRD: 4-slide wire former
HEENAN & FROUDE: Wire forming, 4-slide machines (new)

MISCELLANEOUS

CENTERING MACHINE: Sundstrand, 44" Double End.
CUTOFF: Campbell, abrasive 425 Cutalator 4½" dia. Capacity
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
LATHES: Blount Polishing Speed Lathe, 12" dia. x 48" centers
HARDNESS TESTER: Gogan Brinell Model 16-8
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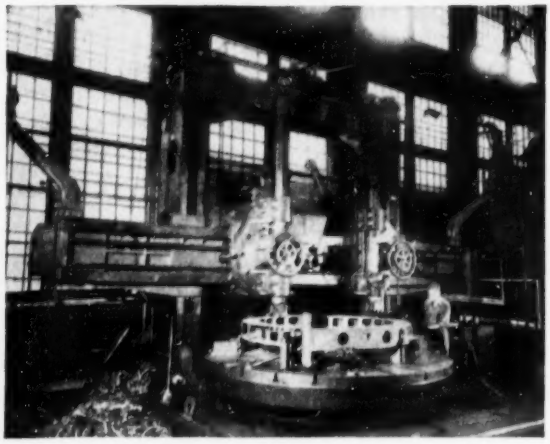

RECENT ADDITIONS TO STOCK

BORING MILLS

Bullard 34" New Era Vert. Turret
Bullard 24" M.D. New Era. Vert. Turret

GRINDERS

Cinn. No. 4 Centerless, Thru-feed
Blanchard #16A Vertical Surface
Norton 10"x36", 10"x50", 14"x96" Plain
10" P&W—Doublewheel. Gear
#11 B&S Plain Cyl.
#13 B&S Univ. & Tool
#2 and #3 B&S Universal

MILLERS

Rowbottom up to 32" M.D. Cam Miller
Potter & Johnson 2M Horiz. Auto.
Cincinnati 08 Plain Horiz. M.D. Production with Riso and Fall Attachment.
#3 Cinn. M.D. Vertical
#3A B&S M.D. Universal
6"x80" P&W M.D. Thread

PRESSES

Henry & Wright 50 ton M.D. Dieing
Clearing Model DS-1500-60, 500 Ton Double Action Press, 1942 Machine
Cleveland 400 Ton #4K Knuckle Joint

LATHES

Reed Prentice 20"x54" centers Geared Head. Q.C.G. 16 Speed.
Hendey 20"x14' Bed M.D. Geared Head Eng.
Lodge & Shipley 24"x10' Bed 12 Speed—Selective Head Geared Eng.
Potter & Johnson #4D-21" M.D., H.S.
36"x17' and 52"x17' American M.D. G.H. Q.C.G. High Duty
Lodge & Shipley 24"x8' B.G. Q.C.G. Eng.
32"x11' centers Bridgeford M.D. G.H. Eng.
20"x14' Hendey M.D. G.H. Eng.

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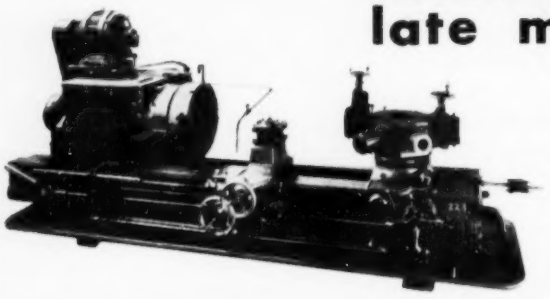

Type 4H8 LIBBY Heavy Duty Saddle-type Turret Lathe. Includes 28" 4-jaw chuck. Swing over ways, 32". Swing over carriage, 30". Spindle hole diameter, 8¼".

THESE LATE MODEL MACHINES HAVE BEEN REBUILT . . . READY FOR SHIPMENT FROM STOCK

12" x 30" LEBLOND Toolroom Lathe
20" x 96" centers LODGE & SHIPLEY Lathe
4½" x 12" and 6" x 20" Model C PRATT & WHITNEY Thread Millers
14" x 36" NORTON Hydraulic External Grinder, oscillating spindle, hydraulic plunge feed
18" x 72" LANDIS Universal Hydraulic Cylindrical Grinder
61A FELLOWS Gear Shaper
72A3 HEALD Gagematic Internal Grinder
72A5 HEALD long base Internal Grinder with cam follower copying attachment

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Machine
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CINCINNATI 12, O.

LATE TYPE MACHINERY

TURRET LATHE: No. 5 Gisholt Ram-Type Univ. Serial No. 62430

MILL: K&T M18 Simplex Mill.

GRINDER: Excello No. 35 Thread Grinder. Serial No. 1180.

SHAPER: 20" Smith & Mills. Serial No. 11482 (1942)

THREADING MACHINE: Landmaco Double Head. 1" Capacity. Serial No. 1-L15.

FOSTER MACHINERY SALES CO.
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Twinbrook 1-0354

PRESSES

No. 85 Bliss S.S.S.C. Tie rod frame, 8" str., M.D.

No. 55 Bliss Consolidated S.S.S.C., equipped with side shear, 4" str., M.D.

50-ton Henry & Wright, equipped with double roll feeds and scrap cutter, 2" str., M.D.

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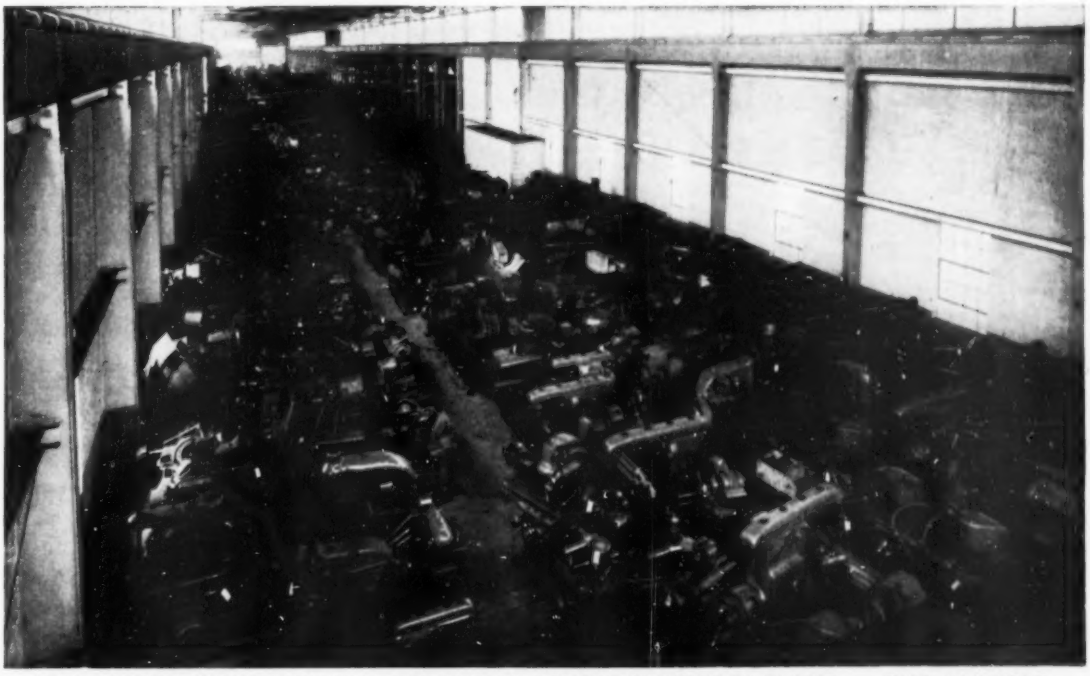

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AUTOMATICS

9 16" Acme, m.d.
7/8" Cleveland Model B, belt
1" Acme, m.d.
1 1/2" Cleveland Model A, belt
4 spindle 1 1/4" Conomatic, m.d., bar, 1942 machine
No. 5D Potter & Johnston, m.d.
No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.
14" Fay Flanders Type, m.d.
4 spindle 2 1/4" Cleveland Model "K", m.d.
No. 8A Cleveland, M.D., 8" cap., latest

BOLT THREADERS

Victor Nut Facing Machine, m.d., cap. 3/8" to 2" nuts
1" Landis Double Spindle, m.d., thru gear box
1 1/2" Landis 2 spindle, late
1 1/2" Landis 2 spindle, older type

HORIZONTAL BORING MILLS

Barrett Double End, 5" and 7" spindles, m.d.
5 1/2" bar Niles-Bement-Pond, m.d.
6" bar Newton No. 2 Cylinder Borer, m.d.
7" bar Niles-Bement-Pond, m.d.
10" bar Sellers, Floor Type, m.d.
Pair tables for use on Floor Type Horiz. Boring Mill, 8' long x 15 3/4" wide x 33" high, 2 T slots
54"x11' Rectangular Table, 40" high

VERTICAL BORING MILLS

36" Bullard New Era, m.d., p.r.t.
42" Bullard Spiral Drive, m.d.
42" Bullard New Era, m.d.
42" King, m.d.
44" Putnam, m.d., p.r.t.
44" Niles, m.d., p.r.t.
52" King, m.d.
53" Niles Heavy Pattern, m.d., p.r.t.
73" Niles, m.d., p.r.t.
100" Niles Heavy, m.d., p.r.t.
12' Niles, m.d., p.r.t.

BROACHING MACHINES

75 H.P. LaPointe Hydraulic Broach, m.d.
Cincinnati Mill Broach, m.d., 10" spindles, new
12x72" Thompson Automatic Flat Broach, m.d.

RADIAL DRILLS

2 1/2'—10" col. American Triple Purpose Plain, m.d.
3' American Triple Purpose Plain, m.d.
3'—13" col. Cincinnati-Bickford Super-Service, m.d.
3 1/2'—9" col. Cincinnati-Bickford Plain, m.d.
4'—11" col. Dreses, gear box, m.d.
5'—13" col. American, gear box, m.d.
7'—16" col. American Triple Purpose, m.d.
8'—17" col. Dreses, gear box, m.d.
8'—19" col. Cincinnati-Bickford Super-Service, m.d.
Zewo Precision Universal Bench Type Radials, m.d., new

BALL BEARING DRILLS

No. 15 Buffalo, Floor Model, m.d.
No. 18 Canedy-Otto, Bench Model, m.d.
Providence Engineering Co., Model E, s.p.d.
No. 1/2, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 4 Fosdick, 8" overhang, belted m.d., No. 2 Taper
1 spindle Allen, belted m.d.
2 spindle Allen, belted m.d., 8" overhang
No. 3 Allen, belted m.d.
2 spindle Avey, size No. 1, type B, style VHP, m.d., 8" overhang
2 spindle Avey, No. 2, 3, belted m.d., p.t.
2 spindle #2 Leland & Gifford High Speed, 8" overhang, m.d.
#1LMS—3 spindle Leland & Gifford High Speed, late, m.d.
3 spindle Leland & Gifford High Speed, Model 3MS, m.d.
4 spindle Avey #1 High Speed, m.d., 7 1/2" overhang, No. 2 M.T.
4 spindle No. 3 Avey, belted m.d., No. 3 Taper, 12" overhang
6 spindle Leland & Gifford, No. 2 Taper, m.d. on each spindle
6 spindle Henry & Wright, m.d., 15" overhang, No. 2 Taper
6 spindle No. 1 Avey, belted m.d.

HORIZONTAL DRILLS

Natco Horizontal Production Boring Machine, m.d., with D-11-HU heads
3 way Natco Horizontal Drill, consisting of 3 E13 Hole Units
No. 1/2Bx30", Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. 1/2Bx50" Pratt & Whitney Gun Barrel Rifling Machine, m.d., latest
No. 1Bx74" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d., latest
No. 1 1/2x105" Pratt & Whitney 2 spindle Deep Hole Drill, m.d., latest
No. 1 1/2x105" Pratt & Whitney 2 spindle Gun Barrel Rifling Machine, m.d.
No. 1 Pratt & Whitney 2 spindle Deep Hole Drill, belted m.d.
No. 1 1/2 Pratt & Whitney 2 spindle, m.d., old type
Special Horiz. Drill, Machine, Cinti.Bickford Head mounted horiz. on base

MULTIPLE SPINDLE DRILLS

C13 Natco, m.d., 16x24" rect. head
No. 3 Baush, m.d., 16x30" head, 6 spindles
No. 3 Baush, m.d., 20x40" head, 6 spindles
No. 16 Foote-Burt Fixed Center, m.d.
3 spindle Rockford Gang Drill, m.d.
3 spindle 24" Barnes All Geared Self-Oiling, m.d.
3 spindle 28" Cinti. Bickford Upright Drill, m.d., No. 4 Morse Taper
4 spindle Niles-Bement-Pond, m.d., 12' rail, No. 5 Taper

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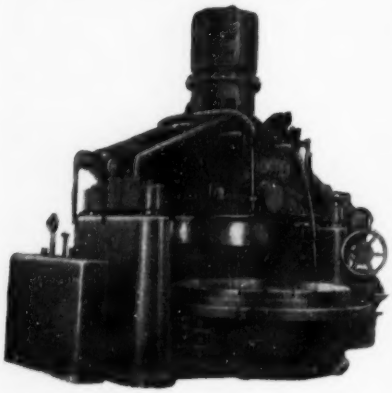
Late Type Machines in Guaranteed Operating Condition **FOR SALE OR RENT**

84" LUMSDEN ROTARY SURFACE GRINDER SERIAL NO. 1-3025



ENGINE LATHES
14"x30" Hendey—1942
16"x30" Monarch—1942
20"x96" Sidney—1932
20"x72" Reed Prentice—1925
22"x168" Lodge & Shipley—1947
30"x96" Monarch—1937
54"x18' Houston, Stanwood & Gamble—1920

TURRET LATHES
2—#3 Gisholts, Bar and Chuck—1943
2—#4 Warner & Swasey, Bar & Chuck—1942
#7 Bardons & Oliver, Bar & Chuck—1940
3—#1L Gisholts, Bar & Chuck—1932-42
#1A Warner & Swasey, Bar & Chuck—1942
#21B Bardons & Oliver, Bar & Chuck—1945
#3L Gisholt, Chuck—1942
#4A Warner & Swasey, Chuck—1942

PRODUCTION LATHES
2—15"x30" Lipe Carbo-Matic—1942
2—16"x33" Fay—1943
20"x25" Fay—1948
#16AL LeBlonde—1940
8"x108" Lo Swing—1947

HORIZONTAL BORING MILLS—TABLE TYPE
3" Universal—1925
3" Fosdick—Excellent Condition—1924
3½" Universal—Excellent Condition—1925
#32 Lucas—Excellent Condition—1926
#330-T Giddings & Lewis—1940

VERTICAL BORING MILLS
24" Bullard—1926
42" Bullard—1928
42" King—2 heads in rail, Side Head—1932
42" Bullard Cutmaster—1947
54" Bullard—1930
64" Bullard—1933

MILLING MACHINES, HORIZONTAL, VERTICAL AND PLAIN
#2H K & T Plain Horiz.—1943
#3H K & T Plain Horiz.—1943
#3B K & T Plain Horiz.—1929
#3K K & T Plain Horiz.—1943
#3V Van Norman Vert.—1942
#3H K & T Vert.—1942
1854 K & T Simplex Prod. Mill—1943
1402 K & T Simplex Prod. Mill—1932

GRINDERS
#35 Ex-Cello Precision Thread Grinder—1942
10"x16" Norton Type C Plain Cyl. Grinder—1942
84" Lumsden Vert. Rotary Surface Grinder—1940
72A3 Heald Sizematic Internal Grinder—1943
72A3 Heald Extended bed, Internal Grinder—1943
72A Heald Internal Grinder—1943
3B Abrasive Auto. Surface Gr.

LATE TYPE MISCELLANEOUS
12" 6-Spindle Bullard Type D. Multimatic—1943
Hammond Radial Drill & Tapper—1942
24" Cleereman Heavy Duty Drill—1942
Type A Barber-Coleman—1942-47
7125A Fellows Gear Shaper—1943
61 Fellows Gear Shaper—1943
61A Fellows Gear Shaper—1943
#665 Toledo Knuckle Joint Press—1934
Type A Barber-Coleman 84" Extended Bed—1937
20" Cinn. Heavy Duty Shaper—1945

EMERMAN MACHINERY CORP.

879 WEST 120TH STREET Telephone: PUllman 5-7626 CHICAGO 43, ILLINOIS

LATE MODEL MACHINE TOOLS . .

AUTOMATICS
No. 656 New Britain Chucker. 1943.
1⅝" 6 Spdl. Cone Automatic. 1941.
2" Model A Cleveland. 1941.
1-1/16" Model A Cleveland. 1943.
No. 00G Brown & Sharpe. 1941.

BOREMATICS
No. 2112 Excello Single End. Late.
No. 49 Heald Double End. 1942.

BROACHES
HP-100 La Pointe Horiz. Broach. 1945.

DRILLS
Ma-6 Avey 4 Spindle, H.F. 1943.
Allen Single Spindle Drill & Tapper. 1942.
No. 2 LMS Leland-Gifford H.F. 1942.

GEAR EQUIPMENT
No. 7 Gleason "Revex" Rougher. 1943.
No. 6 Gleason Revacycle Generator. 1940.
No. 72 Fellows H.S. Gear Shaper. 1942.
10" Pratt & Whitney Hyd. Gear Grinder. '42.

GRINDERS, CYLINDRICAL
10"x18" Norton Plain Type "C". 1940.
6"x30" No. 12 B & S Hydraulic. 1940.
No. 2 Cincinnati Centerless Grinder. 1944.

GRINDERS, INTERNAL
No. 72-A3 Heald Plain Hydraulic. 1942
No. 24-36 Bryant Hydraulic. 1943.
No. 16A2B Bryant Hole & Face. 1942.
No. 16 CP 16 Bryant Hydraulic. 1942.
No. 16-16 Bryant Hydraulic. 1942.
No. 72 Heald Hydraulic. Gap. 1940.

GRINDERS MISCELLANEOUS
No. 16A Blanchard Auto. Surface. 1942.
Cincinnati Centerless Lapper. 1942.
SG-11 Geargrind Spline Grinder. 1942.
HHS Barber-Colman. 1942.

GUN BARREL MACHINES
No. ½ B x 50 P & W Reamer. Latest.
No. ½ B x 30 P & W Reamer. Latest.
No. ½ B x 50 P & W Rifler. Latest.

LATHES, ENGINE
27"x192" Niles Timesaver. 2 Carr. 1941.
27"x96" Niles Timesaver. 1940.
26"x180" Betts Bridgeford. 1940.
26"x96" Betts Bridgeford. 1940.

LATHES, PRODUCTION
8"x84" Lo-Swing Semi-automatic. 1941.

LATHES, TURRET
36" Bullard VTL. Spiral. Late.
No. 2A Warner & Swasey Saddle Type. 1940.
No. 1A Warner & Swasey Saddle Type. 1941.
No. 1L Gisholt Saddle Type. Late.
No. 3R Gisholt Universal Saddle Type. 1943.
No. H5 Libby Universal Saddle Type. 1939.
No. 5 GISHOLT Universal Ram Type. 1942.

MILLS, PRODUCTION
No. 1848 Milwaukee Duplex. 1942.
No. 2-18 Cincinnati Automatic. 1942.
M-18 Milwaukee. 1943.
No. 3 Cincinnati Univ. Dial Type.
No. 08 CINCINNATI Rise and Fall. 1942.

MILLS, TOOL ROOM
No. 3 Van Norman Plain. 1942.
No. 22L Van Norman Plain. 1943.
No. 2 Saimp Vertical New.
No. 2 Saimp Universal. New.
No. 3 Saimp Plain & Vertical. New.
No. 4 Saimp Vertical. New.

SHAPERS
32" Ohio Heavy Duty Univ. 1951.
16" Gernetti Universal Shaper. New.
20" Gernetti Universal Shaper. New.
24" Gernetti Universal Shaper. New.

Partial Listing — Write for latest stock list

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30"x16' bed AMERICAN High Duty Geared Head Lathe
42"x15' AMERICAN Heavy Duty Lathe
42"x25' centers AMERICAN Heavy Duty Lathe
No. 172 HEALD Gap Internal Grinding Machine for large swing
6"x18" LANDIS Type C Plain Grinder
10"x72" LANDIS Type C Hyd. Pl. Grinder—1942
Nos. 4D and 6S POTTER & JOHNSTON Automatic Lathes
No. 9A JONES & LAMSON Saddle Type Universal Heavy Duty Turret Lathe
No. 8A J & L Saddle type
No. 0-8 CINCINNATI Plain Milling Machines
No. 2M CINCINNATI Vertical Miller, 1941
No. 1-18 CINCINNATI Plain Mfg. Miller
No. 12 B&S Plain Bed Type Production Miller
6"x60" P & W Model C Thread Miller
Type A BARBER-COLMAN Gear Hobber
No. 64 Fellows Gear Shaper
No. 72 FELLOWS High Speed Gear Shaper
No. 12 FELLOWS Gear Shaver, 1943
No. 36BM GOULD & EBERHARDT Gear Rougher
16,20" GOULD & EBERHARDT Industrial Shaper
100" BETTS Vertical Boring Mill, 2 heads

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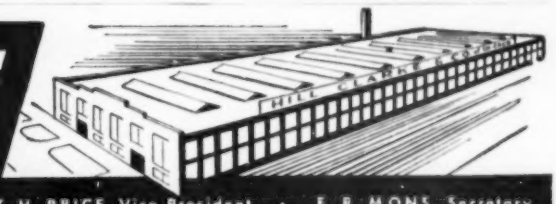

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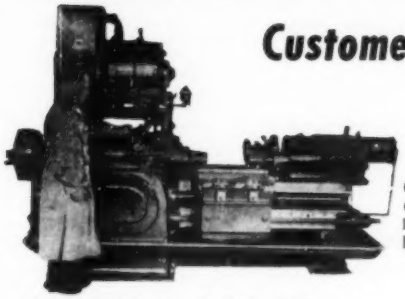

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Automatic Lathe—16½" swing x 33" between centers. Hardways, front carriage with double slide. Back cutoff slide. Motor not included.

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DRILLS
1 Spdl—14" Sw—No. 2 Avey Cam Fd.
1 Spdl.—26" Sw.—No. 2 LMS Leland-Gifford
1 Spdl.—30" Sw.—No. 4 taper Aurora
2 Spdl—24/ Sw—No. 3 Avey
12 Spdl. D-31 Fox, No. 2 Taper

GEAR MACHINES
No. 12HS Gould & Eberhardt Hobber
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper
No. 36-BM G & E 3 Spdl, Rougher
No. 612-A Fellows Gear Shaper
No. 615-A Fellows Gear Shaper
No. 65 Fellows—Cone Dr.
8" cap Red Ring Gear Lapper

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No. 5-B Bryant Internal Grinder
Swing 6½". Traverse 2¾". Recommended bore range ⅛" to 2", swivelling work head for taper. Inspect at our plant.

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6" x 18" Norton Cylindrical (1943)
10"x48" Norton type C (1943)
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10"x36" centers
10"x72" centers
18"x96" centers
24x32 Gap x144" centers
14"x36" centers
14"x72" centers
14"x96" centers
18"x96" centers
20"x96" centers
24"x264" centers
No. A-3—12" Arter Rotary Surf.
No. 1109 Bryant Internal Grd. (1951)
(9" swing—1" bore x 3½" grind stroke)
No. 5 Bryant Internal Grd.
No. 5B Bryant Internal Grd.
No. 16-16 Bryant Internal Grd.
No. 16 A-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 16 A-28 Bryant Internal Grd.
No. 16 F-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 24-36 Bryant Internal Grd.
No. 81 Heald Centerless Internal
No. 74 Heald Internal Centerless

LATHES
16"x54" centers Monarch Toolmakers (1942)
16"x33" R-14 Seneca Falls Auto. Lathe
19"x8' LeBlond Hvy. Duty Lathe
27"x12' American Geared Hd. Lathe
36"x18' Putnam Grd. Hd. M.D.
5W Acme Ram type Tur., 2" Capacity
No. 6 Warner & Swasey Tur.-Bar Fd.
18" Libby Tur. Lathe, M.D.
No. 3AL Gisholt Cross-Slide Tur.
No. 4A Warner & Swasey—7½" Hole—Spdl.

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No. 08 Cincinnati Vert. Mill (1942)
54"x30"x16' Ingersoll Slab Mill
6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney (1942)
10"x60" Pratt & Whitney Thrd. Mill
12"x102" Lees-Bradner Thrd. Mill

PLANERS
36" x 36" x 12' Cincinnati, 2 hds.
48" x 48" x 12' Cincinnati, 2 hds.
48"x36"x14' Gray, 2 hds.
60"x48"x27' American, 4 hds.

MISCELLANEOUS
1"-2" Dia. Cap. Micro. Hor. Hone—#200
¼"-1" Dia. Cap. Micro. Hor. Hone—#H-2
42"—18 gage Economy Power Shear
75 Ton R & K Straight Side Press
3 Ton Fox Hydraulic Press
2—12"x96" Magnetic Chucks
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15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
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No. 2 AVEY CAM FEED DRILL
for long run production; 1½ HP AC Motor, 14" Swing, distance Spindle to table 31".

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LANDIS Cylindrical Grinder 20"x168", M.D.

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AMERICAN Engine Lathe 30"x156" Centers, Geared Head, M.D.

★ MILLERS

CINCINNATI, No. 4, Vertical Mill—1940

INGERSOLL Planer Type Mill, 24"x24"x 12" 2 Swivel Heads, Adj. Rail, M.D.

INGERSOLL Planer Type Mill, 24"x24"x 96", 3 Heads, Adj. Rail, M.D.

INGERSOLL Openside Planer Type Mill, 42"x42"x16', M.D.

★ PLANER

GORTON 36"x30"x8', Box Table, Belt driven

★ RADIAL DRILLS

AMERICAN Triple Purpose Radial Drill, 6'-17", Electric Clamping, M.D.

AMERICAN Triple Purpose Radial Drill, 5'-15", Electric Clamping, M.D.

WESTERN Radial Drill, 7', M.D., 1942

WESTERN Radial Drill, 4', M.D.

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24" Wells Metal Cutting, Vertical

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BARNES 20" — 4-spindle Camel Back Drill; M.D., late.

FOOTBURT 6-spindle Drill; fixed head; table dia. 32".

LeMAIRE 5-spindle Drill; square table; twin ram in head.

MOLINE 6-spindle Boring Machine; adj. rail; M.D.

NATCO #14 Adj. Multiple Spindle Drill; bored for 24 spindles.

CINCINNATI BICKFORD 6-ft., 15" column, Univ. Radial Drill.

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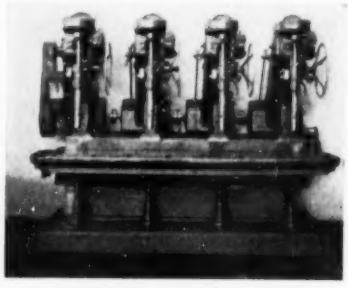

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Brown & Sharpe (5) Model 00G, ⅜" capacity.
Ceco Screw Machine ⅜" capacity.
Cleveland, Model AA-11, Serial #36586.
Cleveland Model B. Serial #42618/843
Conomatic 4 Spindle, Serial #2309FF, 1½"

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Bullard 24" V.T.L., Spiral Drive
Bullard 8'—8 spindle, Multi-Matic
Cleveland 2½" Bar Capacity
Giddings & Lewis #32, 3" #25, 2½" Bar
Kings 42", 72" Vertical 2 rail heads
Niles-Bement-Pond 4", 4½" Bar, 60" Vert.
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New 3" Horizontal Boring Mill

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Baker No. 321 Vertical Boring & Drill
Bausch Multi-spindle
Buffalo #2 Motor Spindle, #16—4 Sp.
Buffalo: Power No. 41, No. 42
Canedy-Otto 21" Sliding head New
Cincinnati Bickford 6'x15" col.
Edlund 8" Model 2B, Sliding Head
Natco #12 20 spindle drill
24" Sibley Sliding head
New Geared Box Col. Drills 24'
Foote-Burt #25 3" capacity
Leland Gifford 2 LMS, 3 MS
Leland Gifford No. 2—4 Sp. Hyd. Feeds
Sigourney 2 spindle

ENGRAVERS

Gorton #1A, ME, 1D, 3U, Deckel GIL, GI
Taylor-Hobson 3 dimensional Pantograph

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Barber-Colman Mod. SHS. Sharpener
Barber-Colman #2, #12 (3)
Barber-Colman Hobber Type S
Brown & Sharpe #3 Gear Mill, 26" Cap.
Fellows High Speed Shapers 712, 725, 71, 7
Fellows #20M Redliner, Flather 72" Cutter
Gleason #2 Surface Hardener, No. 3 Gear Tester
Gleason #3 Spiral, #3 Straight Bevel
Gould & Eberhart 36" Cutter
Michigan Gear Finisher 24" cap., 862-24A
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Brown & Sharpe #5, #2 with Chuck
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Portman 12" Chuck Rotary
Pratt & Whitney 12x36" Vertical
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Brown & Sharpe #5. 3"x18" Cylindrical
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Cincinnati 6x18" Hyd. #4—Centerless
Gardner Disc Grinder 30"—15 H.P. Motor
Grenby Models 1G1 & 1G2—Internal
Gorton Ped. Type Tool Grinder Mod. 375-2
Heald #73 Internal Centerless, Sizematic
Heald 72A3 Int. Centerless Sizematic
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Lempco 54" Swing
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Norton Type C 6"x18" Semi-Automatic cyl.
Norton 10"x18" Type C cylinderical
Norton 14"x96" cyl., 16x48 Univ.
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Oliver #510 Drill Pointer
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Sellers 6-G Drill Grinder
Sellers 69 Tool, K.O. Lee tool
Van Norman #666 Crankshaft

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Bradford 16"x36"
Gisholt Simplimatic 18"x16½, 2 Tables
Hendey 12"x42" and 12x30", 1941, 14" Yoke
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LeBlond 25/50x96" Gap, Late type.
Lipe-Carbo 12"x18" (2)
Lodge & Shipley #3A, Duomatics
Pratt & Whitney 16"x60, 10"x20", 16"x36
Monarch Magna-matic 14"x54"
New 16, 18, 20", 28" Immediate Del.
New Tool Makers 10x24", South Bend 9"
Rivett Model 918 Precision. Mod. 715
Putnam, Sliding Gap 22"/46"x92"
South Bend 13"x5'
Sundstrand 8x15", 15' Stub
Wickes 32"x35' Geared Head

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Brown & Sharpe #2B Plain, No. 2, 3A, 21 #2L
Cinn. No. 3, 4 Plain Spd., 18" Manufacturing
Kent Owens IV, 1-8, 1-14, 1M
Kempsmith #1 Pl., Vert. & Div. Hd.
Milwaukee 2H Universal
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach. 33
Van Norman #2L Univ., Dividing Head, No. 12

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Cincinnati 2 Spindle Hydromatic
Cincinnati (2)—1-18 Plain Automatic
Cincinnati #3, #4 hi-power, 08 Vertical
Cleveland No. 1, table 8"x32"
Gordon 8D Super Speed
Morey #12M Profiler, 2 sp. #2 Maximiller
Reed Prentice Vert. Mill & Die Sinker Mod. 3VG

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Bliss 650 Hi-Production Presses
Bliss 18, 19, 21, OBI, 58, 62, 162, OB
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton SS, Bliss 74½
Bliss 5-48 Dbl. 32x48" bed, Cushion
Hamilton 850 Ton S.S. Bed 27x48
Hamilton 110 FM Die Tryout Press
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Niagara Horning, 15 Ton—Toledo 32 Ton Honing
Niagara A13¼, O.B.I., Niagara No. 27
Stokes Tablet Press, type R, Late, Model F
Toledo 92½c Double Crank 43x23" bed
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing
Walsh No. 3 O.B.I. 23 Ton, L1 #3
Z & H #4½, O.B.I. 20 Ton

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Brown & Sharpe, #2 Hand, #10, 11
Foster #2B 2½ Cap. Morey #2G Late
Gisholt 2L, Cross Slid. Tur.
Gisholt #5, Bar Feed, Plenty of Tools
Gisholt 4R—9¼" hole in spindle
Libby 1 HS with threading att.—3R, 4R
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1, 1A, 2, 3, 4, 5

MISCELLANEOUS

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Bolt & Pipe Threader: Landis, Oster-Williams
Broach: New 6 Ton, Horizontal, 11 Ton, Vertical
Hacksaw: Peerless 6"x6", Racine 6"x6"
Jig Borers: New Swiss
Keyseater Davis, Baker
Pipe Bender, Kane & Roach, Vari-drive
PLANER: Niles-Bement-Pond 36x36'x10', Gray 24"x24"x8'
Rotary Table: Cincinnati, power take-off
Saw: Shaping 6x6", 13x13"
Scrap Cutters & Granulator: Ball & Jewell
Shapers: 24" Rockford, 24", 28"
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Model 3 Newark Universal Gear Hobber (1943)

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Footburt No. 1 Vertical Hydraulic—5 Ton cap. —Stroke 39"—MD

Cincinnati No. 5-54 Duplex Hydro Vertical—5 ton cap.—stroke 54"—1951 machine—MD

Lapointe No. 2L Horizontal Hydraulic—7½ ton cap.—stroke 48"—MD

GEAR CUTTERS

Barber Colman Type "A" No. 12—Outer support—Arbor support—Feed & index gears—MD—Late type

Gould & Eberhardt 96"x30" Automatic Spur & Helical—Auxiliary table Power feeds—MD

Pfauter No. 5 (118"x22") Automatic Spur, Helical & Worm with attachment for herringbone—MD

GRINDERS

Norton 10"x18" Type C Plain Mechanical—MD —1942 machine

Landis 10"x18" Type C Plain Hydraulic—Plunge cut—Oscillating spindle—MD

Cincinnati 10"x48" Plain Hydraulic—Filmatic bearings—Power infeed—MD—Late type

Norton 12"x36" Universal Hydraulic—Internal spindle—MD—Late type

Cincinnati No. 2 and No. 3 Centerless—Filmatic bearings—Late type—MD

PRESSES

V & O No. 1, 2½, 3½ and 4 OBI—All MD—Some with roll feeds—Late type

Cleveland No. 4K Knuckle Joint—400 ton cap. — Stroke 2½" — Pneumatic clutch — MD —1946 machine

Bliss No. 75½ Straight Side—Stroke 4"—Side shear—MD

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42" King, Side Hd., 1942
7" bar Niles Floor Type
4½" bar G. & L. No. 45, Table
3½" bar G. & L., Table Type
3" bar Lucas, Table Type
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4'12" col. Rocco (New) $6900
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3½" Morris 9" col. "Mor-Speed" M-on-Arm
27" Arbega 7¼" col. (New—Swedish)
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DRILL MULTI, W-7 Baush 32 spin., 1947
GEAR SHAPERS, Nos. 6IA & 75 Fellows
GRINDERS, SURFACE, 12" Heald No. 22 M.D.
14"x36" P. & W. Vert. Spin.
No. 33 Abrasive Vert. Spin., 22"x8"
No. 3B Abrasive Hor. Spin., 22"x8"
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26"-48"x18' bed McCabe, Dble. Spin.
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36"x30' bed Niles, 2 carr.
26"x12' bed Bridgeford & B. & E. (3)
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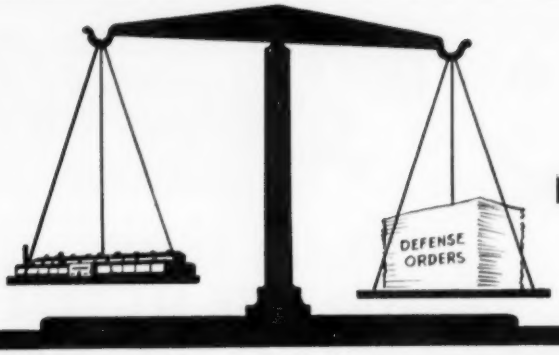

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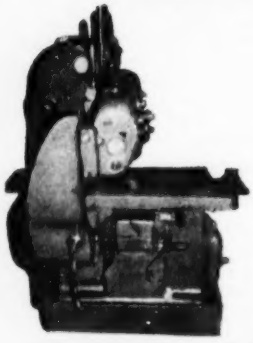

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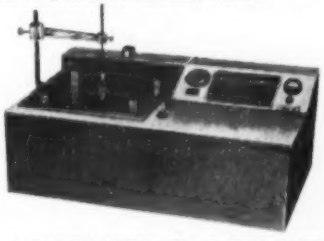

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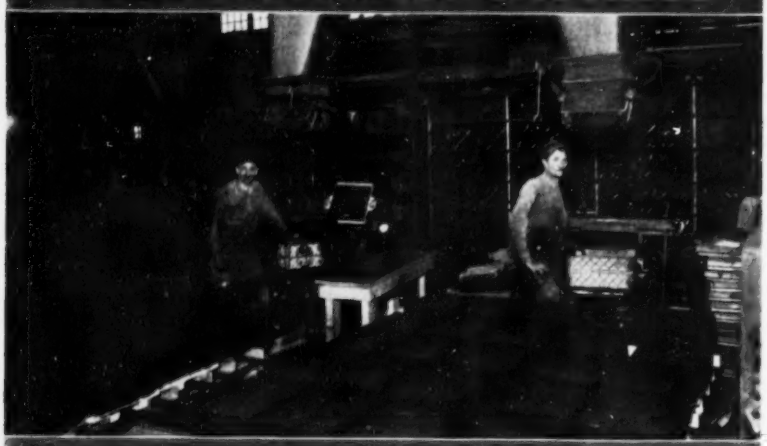

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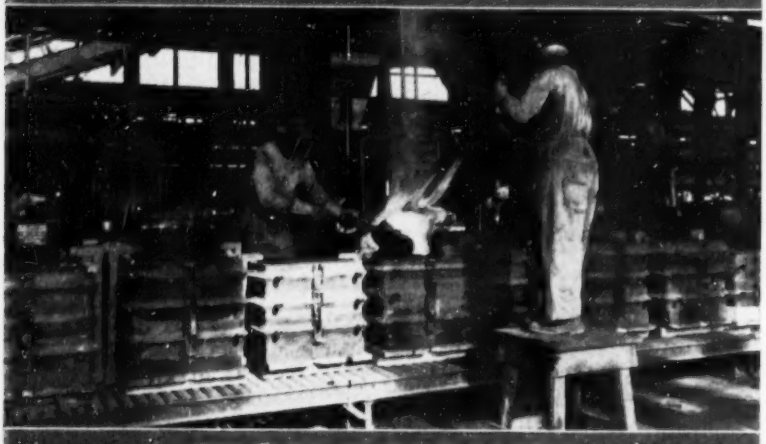

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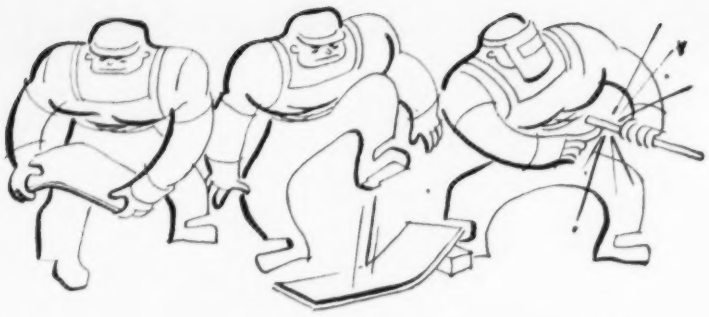

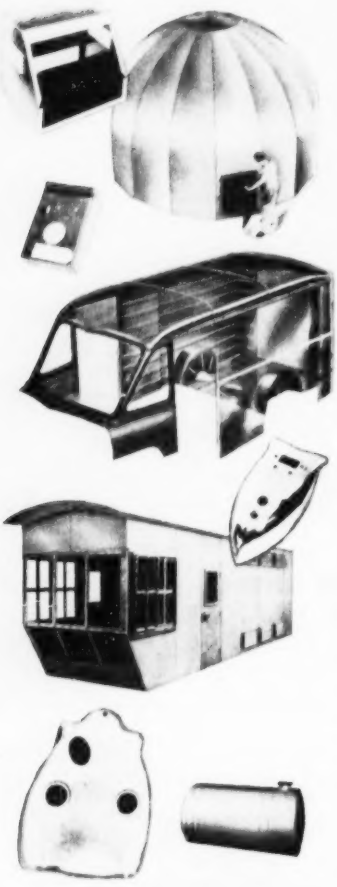

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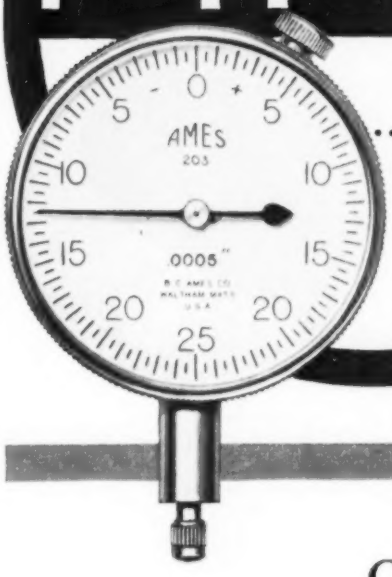

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Greenfield, Mass.

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It's easy to get
HIGH PRODUCTION
. . . and UNIFORMITY, too!

Wire and Ribbon Metal
FORMING MACHINES

UNIFORMITY in automatic production doesn't come by chance! In the case of wire and ribbon stock forming on NILSON 4-SLIDES, *it means control of the material from the coil to the final form.*

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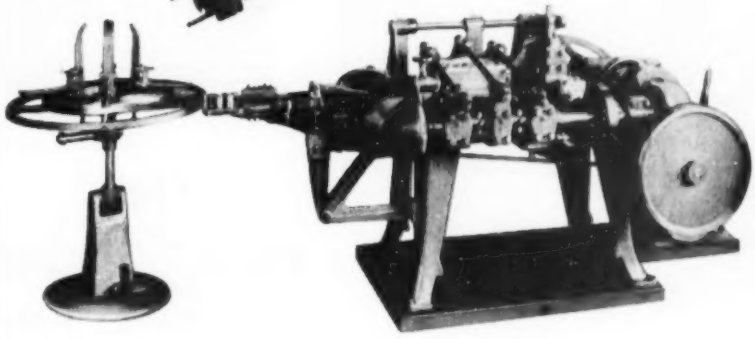

Close-up of the NILSON forming section with the built-in Horizontal Press to the left. This design eliminates secondary handling and insures product uniformity because the sequence of stamping and forming is automatically controlled.

Close-up of the NILSON feed mechanism . . . capable of feeding wire and ribbon metal to tolerances of .001. Another important element in insuring product uniformity. Positive control is maintained over the material regardless the length of feed.

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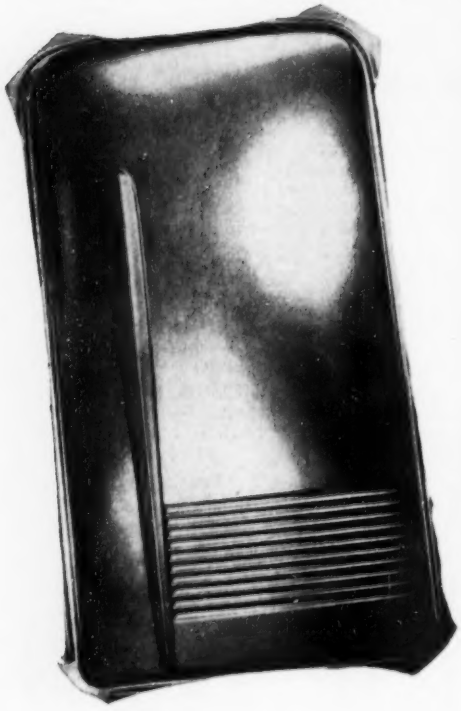

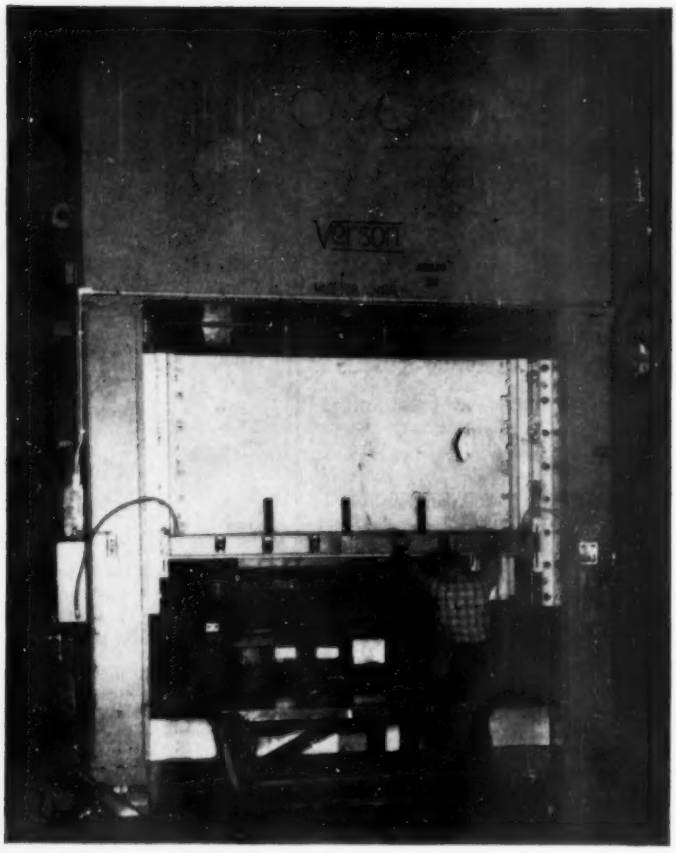

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At Admiral Corporation's Midwest Manufacturing Division in Galesburg, Illinois, all heavy press and press brake equipment is of Verson manufacture, especially for Admiral. The press illustrated above is typical—a 600-ton Verson full eccentric with two points of power application to produce large pieces such as the refrigerator door shown. Other full eccentrics in the Verson line-up at Admiral range from 200 tons to 600 tons capacity.

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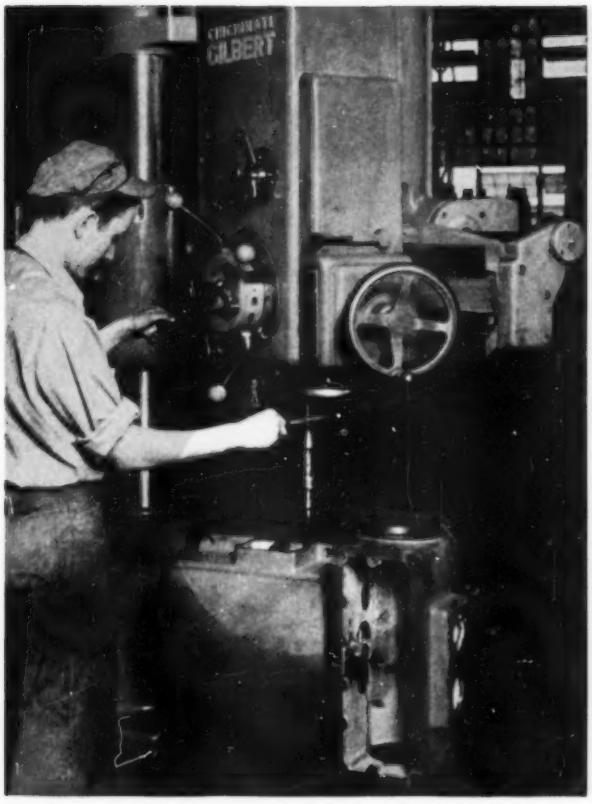

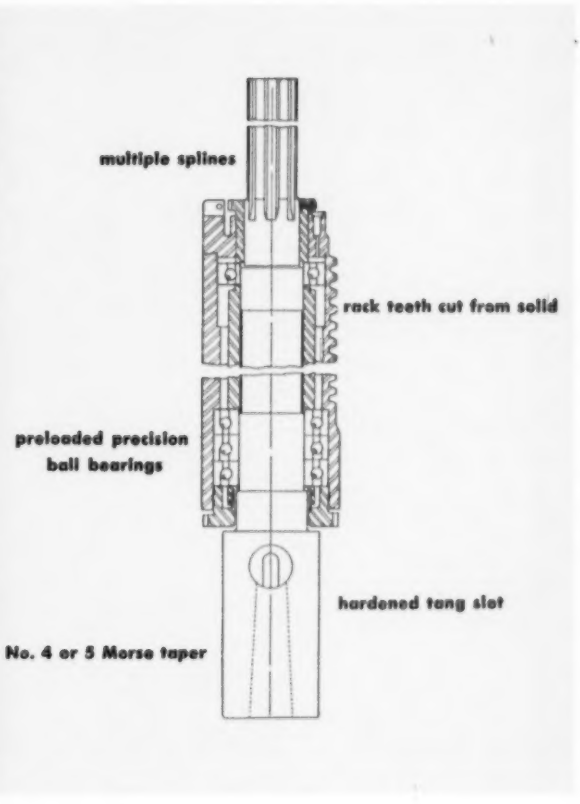

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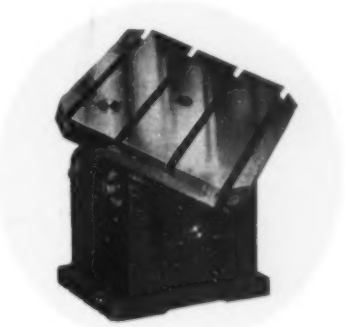

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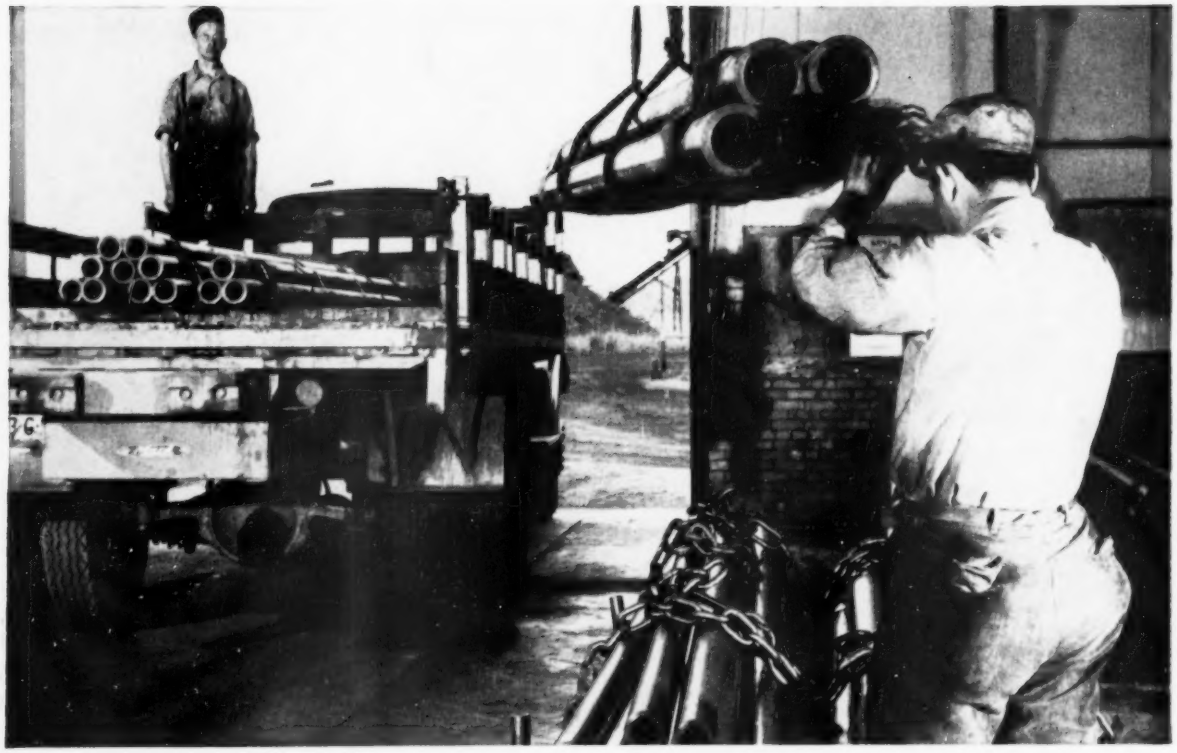


52100 tubing shipped within 24 hours after you order!

GOT a rush hollow-parts job? The Timken Company will ship less-than-mill-quantities of 52100 tubing within 24 hours after receipt of your order.

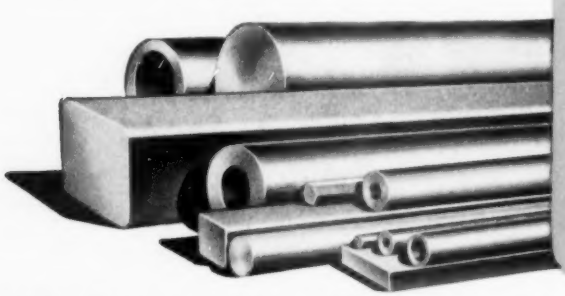
Timken® 52100 steel will do most of your hollow-parts jobs. It can be heat treated to file hardness and tempered back to any desired point. A high carbon steel, it is through-hardening in moderate sections, has high wear resistance and can often be used in place of more expensive steels. And it comes in sizes from 1″ to 10½″ O.D.

Here's a partial list of hollow-parts jobs for which Timken 52100 steel is used: aircraft parts, ball bearing races, pump parts and plungers, collets, bushings, spindles, grinding machine parts and precision instruments.

The Timken Company's unmatched experience, as a pioneer producer of 52100 tubing, has resulted in uniform quality from tube to tube and order to order. Rigid quality control checks every step of production.

For immediate delivery of your less-than-mill-quantity orders, write, wire or call The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



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